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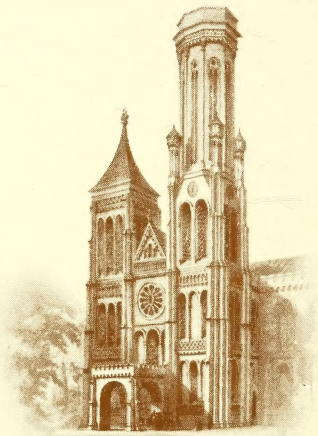

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE BURIED CITIES OF ASIA MINOR

BY ERNEST L. HARRIS

AMERICAN CONSUL GENERAL TO SMYRNA

This is the third and last article by Mr Harris describing some of the ruined cities of Asia Minor. The first and second articles were published in the November and December, 1908, numbers of this Magazine.

THE ancient roadway to Colophon was a sacred way, and on either side, at the base of the hills, were erected mausoleums as receptacles for the dead. Today there are no traces of this roadway to be found, but of tombs and temples the signs are plentiful on every hand. In many parts of the valley one stumbles upon rows of columns projecting out of the earth. This valley is an archeologist's paradise. I can fully appreciate what Sir William Ramsay said about this particular district a few years ago:

"If I could afford it, and might choose where and how I would spend the rest of my life, I would choose to camp on the site of old Colophon, and live out my remaining days digging among its old ruins."

The inclinations, temperament, likes, and dislikes of people are different. Some enjoy hunting big game and seek it in the jungle, brake, or trackless forest; others climb steep mountain ranges, while some like yachting; but give me the horse that can respond to the wishes of its rider and a camera for a true companion; then give me Asia Minor, with its ruined cities, to explore, and I have a sport which, in my judgment at least, surpasses in novelty and charm anything offered by those above mentioned.

WHERE NIOBE LIVED

Magnesia ad Sipylum, now called Manisa, is a real Turkish town. The modern city, with a population of about 35,000, has no less than twenty mosques, each one having from one to three minarets. The view of the town, with the steep cliffs of Mount Sipylus in the background, which is always covered with snow until about the first of May each year, is exceptionally picturesque. The dwelling-houses, too, are all in accord with the dreamy, sleepy life of the old place. In some of the narrow streets one can scarcely see the sky above, for the reason that the second and third stories project out beyond each other in the form of balconies with latticed windows, so that the houses on either side of the street almost meet in the middle. In this respect they are even more unique than some of the houses in certain streets

in the old town of Braunschweig, in Germany.

On returning from a visit to the Niobe (see page 3) I was fortunate in meeting with a Turkish wedding procession. A wedding in a Turkish town or village is an event which calls for proper celebration—at least, the volume of noise made carries that impression to the stranger. At the head of the procession in question six drummers marched, vigorously beating cowhide drums, while in the row next behind came the fifers blowing shrill blasts on tin and willow whistles. The bride was seated in a large screened sedan chair, which was strapped to the backs of two mules. Following in some ten closed carriages came the usual coterie of veiled women, while the men marched at the sides or between the carriages.

Manisa, so legend has it, was founded by the Amazons before the time when history began to be chronologically recorded. The history of the city has been a checkered one, as it belonged at various times to the Lydian, Persian, Roman, Byzantine, and Turkish empires. Manisa seems, however, to have remained more or less uninfluenced by Attic and Ionic civilization. Under the reign of Tiberius the city was destroyed by an earthquake and rebuilt by that emperor. During the days of the Crusaders the city flourished, and many bright chapters were added to romantic history by the deeds of John Ducas and the Catalan Roger de Flor. In 1402 Tamerlane ravaged Asia Minor and made a storehouse of Manisa for the plundered wealth of Smyrna, Sardes, and other populous cities throughout the country.

The mosques of Manisa are considered to be exceptionally fine, and any one interested in the art and architecture of such structures should visit this town. Some of them are reconstructed old Byzantine churches, in which many traces of Christian worship may still be seen. One of the sights which the Turks show with considerable pride in one mosque is an old Genoese clock, the machinery of which seems still to work in perfect order.

Magnesia ad Sipylum was the birthplace and home of Pausanias. Under the reigns of Hadrian and the Antonines he traveled extensively in Asia Minor, Syria, Egypt, Greece, and Italy. Ten books were the fruit of these journeys, and next to the works of Pliny they are looked upon today as an authority not only upon the subjects of antique art, but upon the topography of these countries as well.

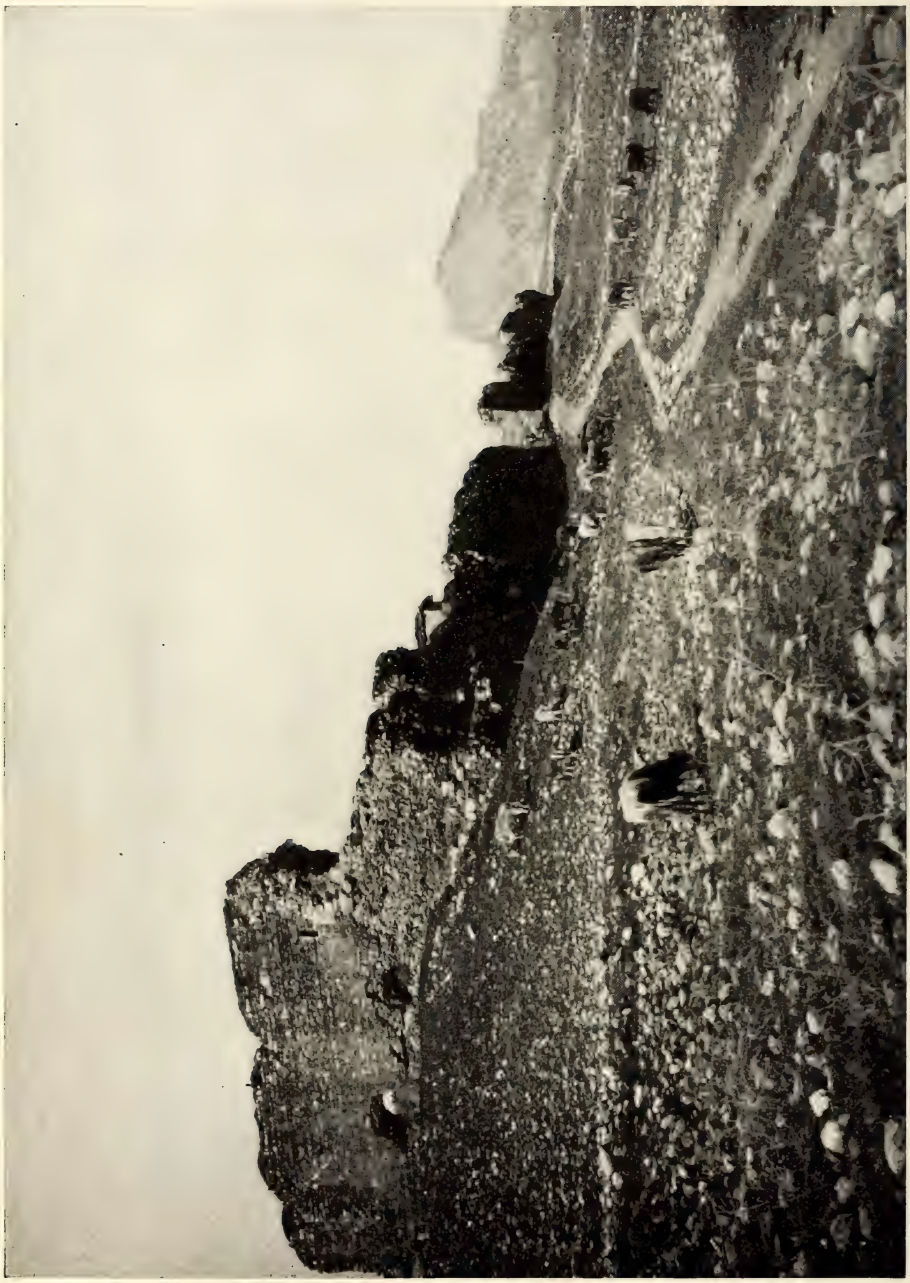
About an hour's drive from Manisa, and immediately at the foot of Mount Sipylus, there are many ancient ruins, such as rock-cut tombs, caves, mounds, and upon a very high peak an acropolis. Above all there is the rock-hewn image of the Niobe. There seems to be considerable controversy on this point among archeologists, but that we have before us the huge figure of a woman in a sitting posture there can be no doubt. The figure is about 30 feet in height and can easily be seen from the valley below. During most of the year water drips over the face, thus fulfilling the old description of the Niobe who wept for her children (see illustration, page 3).

About 700 feet above the Niobe, on an almost inaccessible peak, is a mausoleum supposed by many to be the true tomb of Tantalus. There are also distinct traces of small rooms or dwellings which have been chiseled into the rocks. The mountain at this point is disfigured by deep rifts and chasms, the home of numerous vultures, and it is impossible for the stranger to get to the top without an experienced guide.

Just below the Niobe, beyond a little lake which catches the waters of the snow that melts on Mount Sipylus, stretches the plain of Magnesia, where that great battle was fought in 190 B. C., which was not only one of the great battles of history, but in many respects one of the most decisive, for it gave the Romans Asia Minor and marked the last futile attempt of Hannibal to check the expansion of Rome.

THE NIOBE ON MOUNT SIPYLUS AT MAGNESIA

This is a figure cut in the rock and is supposed to represent Niobe weeping for her children. According to the legend Niobe was the daughter of Tantalus, king of Lydia, and the wife of Amphion, king of Thebes. She was the mother of many children, the numbers varying in the legends from twelve to twenty. But in her pride she incurred the enmity of Leto, the mother of Apollo and Artemis, by boasting of her superiority. The goddess therefore sent Apollo to kill Niobe's sons with his arrows, and Artemis to slay her daughters. Niobe's grief was so terrible that the gods transformed her into a stone image on Mount Sipylus.



RUINS OF SARDES, THE HOME OF CRŒSUS AND PROBABLY THE WEALTHIEST CITY OF ANCIENT TIMES
(SEE PAGE 5)

SARDES

The castle hill at Sardes, even today, is practically inaccessible. What it must have been 2,500 years ago, before earthquakes and the natural process of erosion rendered the ascent less steep, can only be conjectured. This hill, rising from the plain to a height of 1,000 feet, with a small, flat table-land at the top, was an admirable place to choose for the purpose of defense.

There is considerable fable connected with the early people who located here, and beyond a surmise that they must have been tribes sprung from the great Indo-Germanic race of central Asia, nothing seems to be definitely known, not even the dates of their migrations. These early races were succeeded by the Lydians, a Semitic race which probably wandered in from Assyria.

From all accounts the Lydians were extremely industrious, and the city of Sardes, which they founded at the base of the hill just described, became proverbial for its wealth and luxury. That the country-side about Sardes must have been very rich in ancient times those who visit the place today see ample signs. The soil is of a deep light or dark colored loam, depending upon the location, and it is especially adapted for vineyards, which at present form the chief wealth of these parts.

In addition to the natural richness of the soil, the Lydians found that the Pactolus, which flowed through the center of their Agora, or market-place, contained rich deposits of gold, and this soon became the chief source of their wealth. They turned all their natural advantages to account, and at that time Sardes easily rivaled any one of the Ionian cities with which close commercial relations were fostered. Such was the need for commercial facilities that Sardes soon began to feel the lack of direct communication with the sea, and for this reason war was made upon Colophon and Magnesia, on the Mæander, which cities were captured and Lydian influence extended toward the coast.

About 600 B. C. Smyrna also became Lydian, and Miletus, which at that time was mistress of the Ægean Sea, formed an alliance with Sardes, thus practically uniting the chief land and sea powers of Asia Minor.

THE RICHEST MAN OF ANCIENT TIMES

Under Crœsus Lydia reached the acme of its power. Ephesus also came under the control of Sardes. While the Ionian cities lost much of their self-government, they had the satisfaction of seeing Sardes become more or less Grecianized. Crœsus himself was very favorably disposed toward Ionian civilization, and is said to have lavished vast sums upon the temples at Ephesus and Didyma.

Lydian supremacy, however, in Asia Minor was short lived. In 546 B. C. Crœsus was defeated in the valley of the Hermus by the Persians, and even Sardes and the castle capitulated, Crœsus himself becoming a prisoner.

There is a story about this surrender of Crœsus which is worth relating here. Whether it is fact or fable I do not presume to know. When the kingdom of Lydia was at the height of its power Crœsus was very wealthy, and he was at the same time very fond of making an ostentatious display of his treasures. When Solon, the great lawgiver of Greece, visited Crœsus in his castle at Sardes the vaults containing the gold of the Pactolus were shown to him, and the question asked who, in his opinion, was the happiest man in the world.

The sage of Athens replied by naming an obscure Athenian of humble position who left his wife and many children, with whom he was happy, to fight for his country, and had fallen fighting in the moment of victory. That man, in Solon's modest judgment, was happier than Crœsus with all his wealth, and he warned his host that one might be wealthy and in a position to gratify all the whims of life, yet a change might come. Therefore he could call no man happy until he had seen his end and knew the nature of his death.

Only a few years later Cyrus stormed the castle of Sardes, and fable has it that Crœsus' life was spared, even when he stood upon the funeral pyre, by the Persian monarch when he heard from the captured Lydian king the story of Solon's warning.

Under Persian rule Sardes was the seat of a satrap. In 499 B. C. the Greeks marched from Ephesus and stormed the city, but did not succeed in getting possession of the castle. Xerxes made it his base of operations against the Ionian cities and Greece, and later Alexander, in turn, made it his base of operations against the Persian Empire. Under Rome Sardes had a new era of prosperity, especially when Tiberius rebuilt the city after the disastrous earthquake of the year 17 A. D. Sardes was finally destroyed by Tamerlane in 1402, and since that time the site has been more or less in the condition we find it today.

The ruins of Sardes consist today of the following buildings: Odeion, theater, stadion, a large double gate of an old fortification, an old Christian church, a Roman gymnasium or bath, several unknown temples, arches of an old bridge over the Pactolus, two pillars of what is supposed by many to be the Cybele Temple, and last of all what is left of the so-called castle of Crœsus.

Of the old Christian church, which may have been one of the Seven Churches of Asia, nothing now remains but four huge pillars or prongs upon which storks have comfortably built their nests. It is unquestionably constructed from material taken from much older buildings at Sardes, as the architraves are Ionian in style. The foundations of the pillars are built upon large blocks of marble, while the arches have been constructed of brick. Between the foundations and where the brick work begins many interesting pieces of marble have been fitted in.

The necropolis is about an hour on horseback from the station at Sardes. There are in all some sixty enormous mounds containing tomb chambers, all of which were plundered ages ago. The largest is the celebrated mausoleum of Alyattes, described by Herodotus. It is something like 200 feet in height and more than 1,500 feet in diameter at the base, which rests upon an immense foundation of stone.

FEW EXPLORATIONS HAVE BEEN MADE IN SARDES

In my judgment, Sardes would make an excellent place for excavations, as practically nothing has ever been done thus far to unearth any of the buildings. The field is a vast one, and it lies high and dry above the Hermus and Pactolus, so there would be no fear from freshets and swamps. I am fully satisfied that under all those Roman buildings which lie about the field, and are more or less buried in the soil which earthquakes and rain have brought down from the castle hill, there are many Lydian and Greek monuments as old as the pillars of the Cybele temple and dating from the earliest times.

That such an inviting mine has been neglected so long is to be wondered at. If nothing else were brought to light than the inscriptions taken from the ancient Greek temples and built into the Roman public buildings, such finds alone would be an ample reward for any labor and money spent in this direction.

The site of ancient Sardes today, apart from the natural beauty of the ruins, the picturesqueness of which is greatly enhanced by some ivy vines which creep over them, and by the storks which have built nests where they show up to the best advantage, as well as fields green with grass and grain, presents a subject which is food for retrospection. The plunge of Crœsus, from the highest summit of worldly wealth and power to the deepest pit of humiliation and disgrace, has few parallels in history.

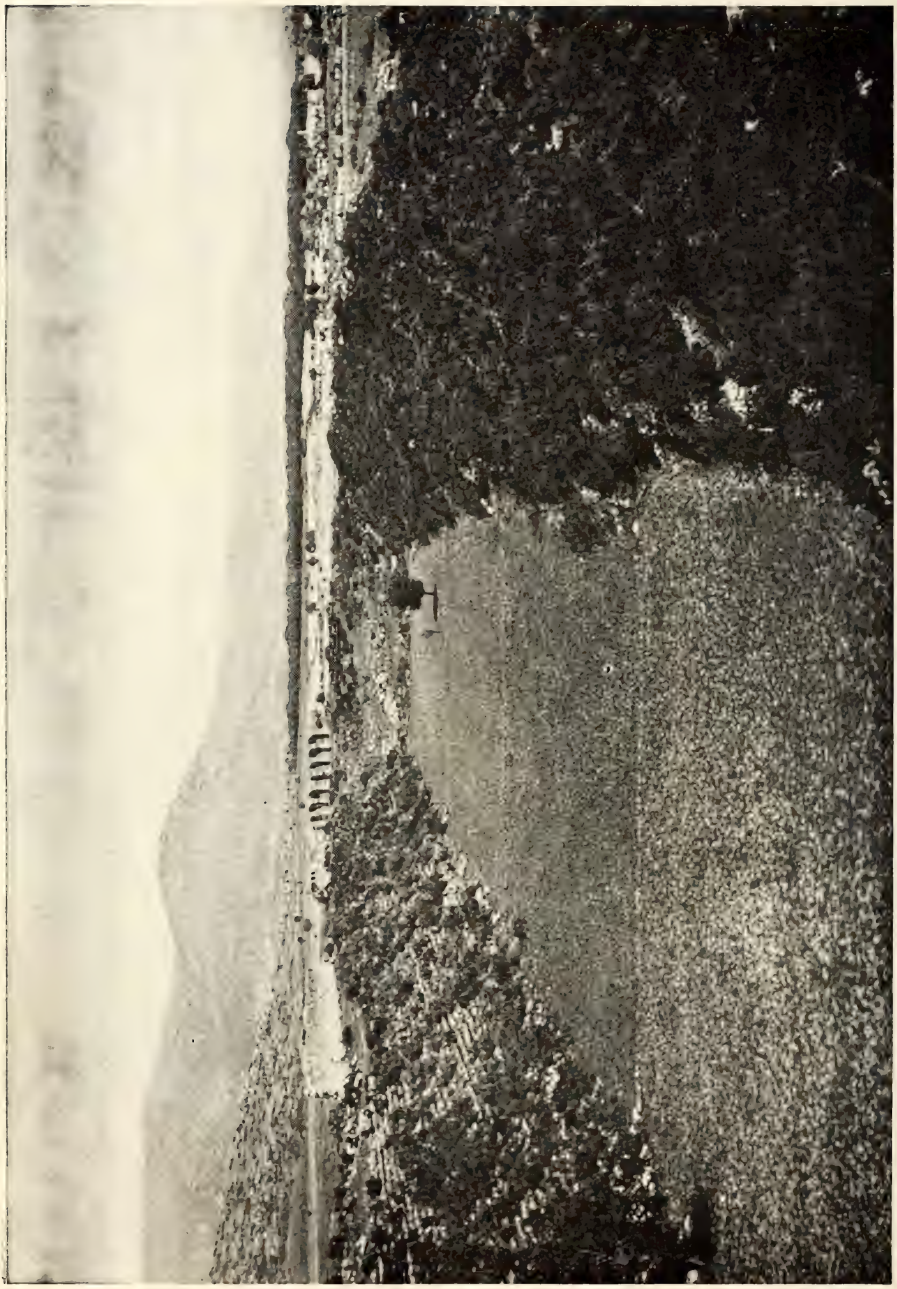
From the castle where Crœsus received in state the ambassadors sent by the tributary cities of Smyrna, of Ephesus, and of Miletus, where a court was held, the splendor of which had not been heard of since the days of Solomon, to

A VIEW OF ANCIENT PHILADELPHIA, TAKEN FROM THE TOP OF THE MINARET OF A MOSQUE

The ruins in front are those of the Church of St. John. On the hills just beyond the town are located the acropolis, theater, and stadium. In the background is the Tmolus range

THE WALLS OF PHILADELPHIA

THE WALL OF TAMERLANE AT PHILADELPHIA, SUPPOSED TO HAVE BEEN BUILT OF THE BONES OF SLAUGHTERED PRISONERS (SEE PAGE 11)



GENERAL VIEW OF THE STADIUM AT APHRODISIAS

This ancient city was the mecca of all athletes (see page 11)

a modest prisoner's dwelling in the city below was a change of fortune which made a powerful impression upon the Ionian and Athenian Greeks. The effect of the downfall of the Lydian dynasty is amply reflected in Greek literature and art of that time.

The stranger who visits this spot today is almost overwhelmed by the contending thoughts which rush upon him. Where noble temples, the best products of an advanced civilization, once stood in all their glory, where an intellectual people once held sway, there stand today a few wretched mud huts occupied by still more wretched inhabitants, who have degenerated to the level of the jackass which is tied to their door and which brays hideously all the day long. The picture is too miserable to describe, too miserable even to photograph. Sardes, the home of kings, the place where the priests performed their sacred rites, where wise men conferred, for the possession of which soldiers fought, is no more!

"The hand of the king that the scepter hath borne,
The brow of the priest that the miter hath worn,
The eye of the sage, and the heart of the brave
Are hidden and lost in the depth of the grave." *

PHILADELPHIA

The historic city of Philadelphia was founded by Attalus Philadelphus about 150 B. C. The walls are the chief object of interest today about the old place, and they are very extensive. In the center of the town are the ruins of what is supposed to be the church of Saint John. Four huge shafts are still standing, and some fresco work of Christian worship still clings to the side of one of them. There are also other ruins in Philadelphia which are all Byzantine in character, but they are so surrounded by buildings or built into houses and walls that it is extremely difficult to find them.

At Philadelphia there are some hot baths and mineral springs which have been celebrated in both ancient and modern times. They are now the property of the Turkish government, and are leased to a private company which bottles the water for shipment to Smyrna. A small hotel has been erected near the springs, and every summer a considerable number of people resort to the place in order to enjoy the baths.

Not far from Philadelphia, in the direction of Mount Tmolus, about a half hour's walk from the mineral springs just mentioned, there is a large wall about 6 feet in height and perhaps 150 yards in length. It is said to have been erected by Tamerlane from the bones of slaughtered prisoners when that conqueror plundered Philadelphia in 1402. Appearances greatly favor this supposition, and I removed several pieces from the wall which greatly resemble bones of the human body. That the wall was erected by Tamerlane there seems to be good grounds for assuming; as to the authenticity of the facts connected with its construction I shall leave for others to decide. One thing is certain, however: it is one of the most interesting relics in all Asia Minor—a monument to the dead, in a way, which presents a strange contrast to the splendid mausoleums which are to be found in nearly every ancient necropolis in this country.

WHERE VENUS REIGNED

In order to reach Aphrodisias (named in honor of Aphrodite or Venus) one must prepare for a five days' journey from and return to Smyrna, 18 hours of which is spent in the saddle. It takes three days to get there and back from the nearest railway station. In the valley that leads to Aphrodisias there are many old Genoese bridges which are still used by the Turks, and they seem to be as solid and substantial in their construction as the day they were built.

Among the ruins of Aphrodisias there are some 30 columns still standing, which at one time belonged to the various temples which adorned this city. With the exception, perhaps, of Baalbek these are the most imposing ruins in Asia Minor or Syria. Aphrodisian monu-

* William Knox.

ments belong to the best period of Greek art, and their foundation dates back to the time when the people of Asia Minor divided their worship between the goddess Diana and the goddess Venus.

It was in its reverence for Venus that Aphrodisias was famous, and this worship lasted in all its pristine vigor until the final overthrow of paganism.

The city was situated in a fertile plain, watered by numerous small streams, some of which rose in the center of the city. These springs today have degenerated into filthy swamps and are now the home of turtles, mosquitoes, and fever. Any future plan to excavate this buried city which does not, first of all, include some scheme to drain these swamps is doomed to failure.

People resorted to Aphrodisias for sports and games, and the free cities of Asia contributed to the erection and adornment of these incomparable public buildings, the remnants of which today call for our deepest admiration. The worship of Venus alone, in a temple the gorgeousness of which sixteen massive pillars still bear testimony, was sufficient to secure for this city the good will of the Roman emperors, for at that time it was popularly supposed that Cæsar was directly descended from that goddess. Perhaps no city in Asia ever enjoyed so much prosperity or has been so much spared from the contingencies of war. So intact were these monuments epigraphically that, until a few years ago, when many inscriptions and objects of fine art were removed, the history of this city and its leading citizens could be traced upon the public buildings.

The Temple of Venus at Aphrodisias was one of the finest monuments of antiquity, but nothing is known of the date of its foundation. After Christianity had forced paganism from the field, and that mystic cult had been banished to the realms of fable, this great sanctuary was transformed into a Christian church and assumed the character of a cathedral. As has been said, sixteen columns are standing in their original positions, while the bases of all the others are still in place. Some of these columns were donated by citizens, who had their names inscribed upon them, together with the purpose of the offering. Many of these inscriptions date to a period prior to Roman domination. Surrounding the temple on every side may be seen in the debris Corinthian columns of the peribolos. It really would not be a very difficult matter to reconstruct the temple and peribolos, so numerous are the fragments that lie about.

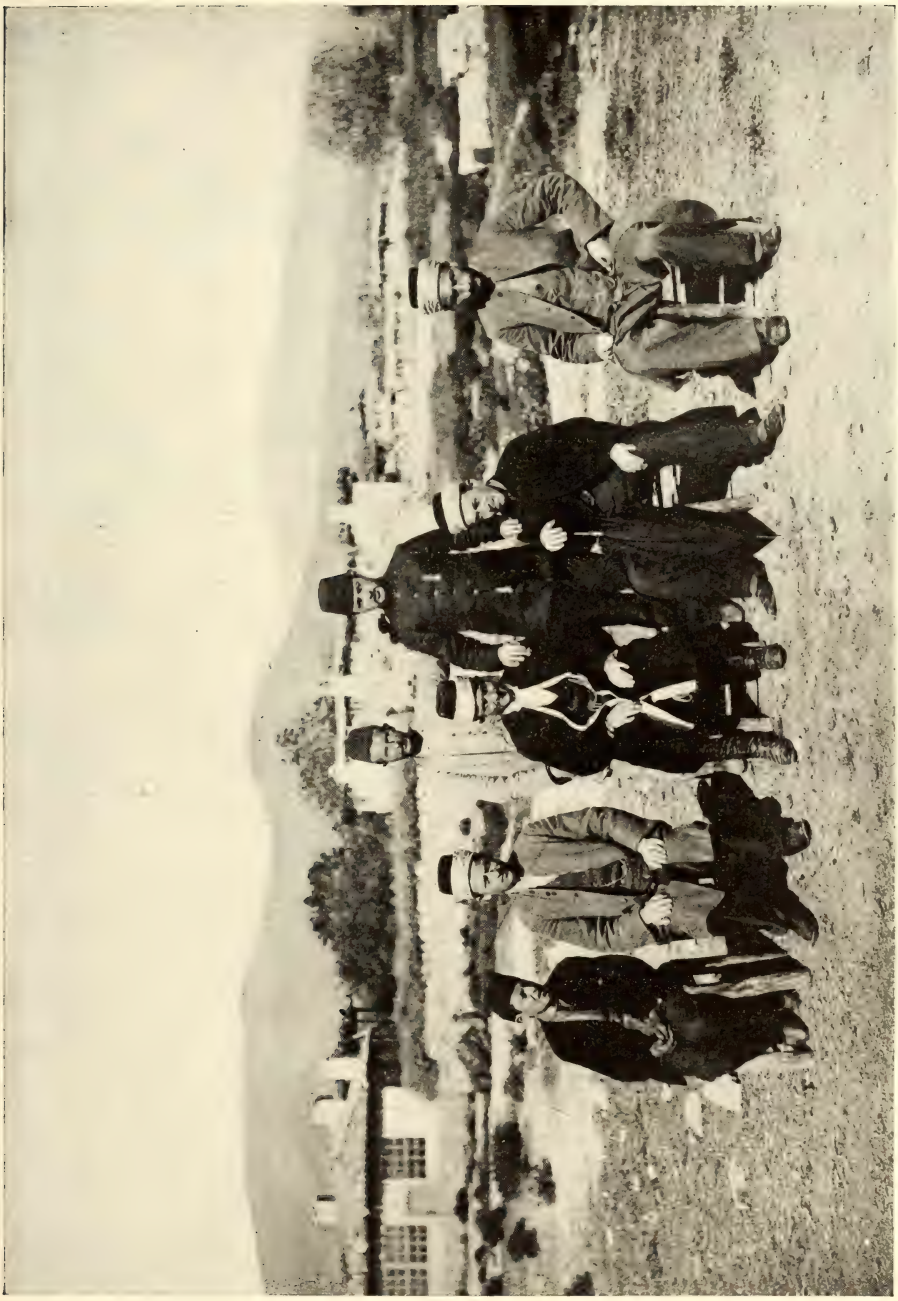
The ruins of Aphrodisias today lie embedded in the foliage of the juniper and Judas* trees. Poppies nod in the fields and the honeysuckle droops from the crumbling arches. Century-old olive trees entwine their roots about the hidden tombs, while in the ivy-covered nooks above, on massive pillars, one hears the songs of birds—not such birds as haunt the fissures in the sides of Sipylus and prey upon their weaker comrades of the air, but the little scolding wren or bluebird, that welcome you and make your stay delightful; and then at eventide you hear the sweet farewell note of the nightingale floating out upon the stillness!

PERGAMUS, FAMOUS FOR ITS LIBRARY

About half way between Magnesia and Pergamus lies the city of Thyatira, which was the seat of one of the Seven Churches. The environments abound in ruins, but the inscriptions are few, and it is doubtful if anything dates anterior to the Roman conquest.

Today Thyatira has assumed the Turkish name of Ak-Hissar, and upon the spot where a certain woman named Lydia once sold her purple there has since been reared a stately mosque, and from the minaret of that same mosque, at dawn and sunset, I have heard the Moslem call to prayer: "God is most great! God is most great! I testify

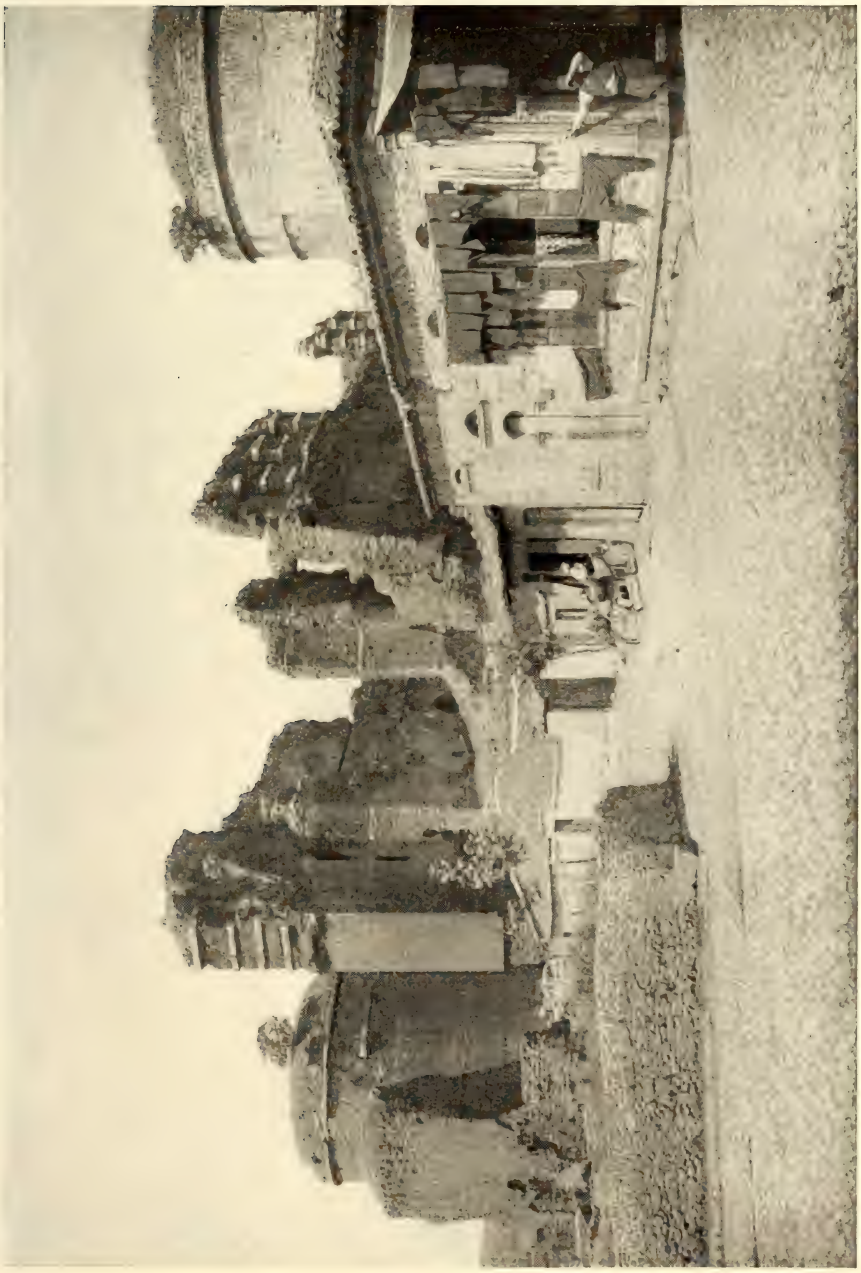
* This is one of the prettiest trees in Asia Minor. It is known as the Judas tree from the popular belief that Judas hung himself from one of them after the Crucifixion. This popular belief is further strengthened by the fact that the deep red blossoms return each year at Easter time.



TURKISH GENTLEMEN AT APHRODISIAS

ROMAN RUINS AT PERGAMUS

The acropolis is on the hill to the right. It was considered impregnable, and was chosen by King Lysimachus as a hiding place for his treasure of $10,000,000 (see page 16)



RUINS OF ROMAN BATHS AT PERGAMUS. THE RED HALL

there is no God but God! I testify Mohammed is God's messenger! Come ye and pray! Come ye and pray! It is better to pray than to sleep! There is no God but God!"

According to Pliny, the ancient city of Pergamus was at one time the most celebrated city in the whole of Asia and one of the brightest centers of Hellenic civilization. Today the ruins are situated 18 miles from Dikili, a small Turkish town on the seacoast just opposite the island of Mitylene and 27 miles from Soma, the nearest inland railway station. The modern town lies at the foot of the acropolis hill and has a population of 17,000 inhabitants, chiefly Moslems and Greeks.

In the old town the traveler may feast his curiosity upon imposing Roman ruins which attest to the development and prosperity of the city under the emperors. The Romans left the Greek city upon the hill intact, and built one of their own in the valley, on both banks of the river which traversed it from northwest to southwest. Their engineers constructed a curious work over the river which covered it for a distance of 640 feet, and some sections of this double-arched tunnel through which the Selinus flowed may still be seen. It was upon this tunnel that the huge bath was built which is known by the Turks today as the Red Hall. On a cypress-covered hill, upon which is spread a large Turkish cemetery, there is also an extensive group of Roman ruins, consisting of the imposing remains of an amphitheater, a badly preserved circus, and the gate of a theater.

The acropolis of Pergamus consists of an immense rock which rises to a maximum height of 1,090 feet above sea-level. It measures about 900 feet from north to south and 400 feet at its narrowest point. Nature had formed upon this mountain four terraces, and upon these were built the monuments of its kings. The acropolis crowned the summit, while on a terrace underneath stood a Roman temple, the Trajaneum, and the shrine of Athena Polias. Lower down rises the foundation of the great altar of Zeus and Athena, while still lower is the enclosure of the Agora. This city, built upon a rock of trachytis, had a double character, that of a fortress protected by high cliffs, as well as that of a luxurious city looking out upon a beautiful landscape.

The creation of the Greek city of Pergamus was practically the work of one family of kings. Some 400 years B. C. the town was insignificant, and Xenophon carried the place by storm on his march through Asia Minor. It may possibly have been visited by Alexander the Great. For safe keeping King Lysimachus deposited a large treasure in its fortress with Philetearos, who succeeded in keeping it after the former's death. This treasure, which was something like $10,000,000, an enormous sum in those days, proved to be the starting point of the rise of Pergamus to power.

Philetearos left the government and legacy to his nephew Eumenes, who was a prince of exceptional qualities. His successor was Attalus I, who was proclaimed first king of Pergamus after a series of successful wars against the Syrian kings. He reigned 44 years and endowed Pergamus with many of its most splendid monuments. His son Eumenes II founded a famous library consisting of 200,000 volumes, which was presented later by Mark Antony to Cleopatra and was eventually destroyed at Alexandria. About this time parchment was discovered at Pergamus.

According to Pliny, the Egyptian king Ptolemy prohibited the exportation of papyrus from his country in order to check the development of the library at Pergamus. As a substitute the people of Pergamus invented parchment, which derived its name from the city of Pergamus.

From the acropolis a fine view is obtained of the surrounding country. In the valleys everywhere may be seen the ruins of crumbling aqueducts and broken bridges.

The hills, however, for the most part, are barren of forestry. The ruthless devastation of the timber resources of this

RUINS OF THE UNIVERSITY OF PERGAMUS

Owing to the rapid growth of the library of Pergamus the demands for Egyptian papyrus became so great that the kings of Egypt were obliged to prohibit its export. A clever clerk of Pergamus then began writing on skins and parchment was invented (see page 16).

country for centuries has done its work, and I very much doubt if even a rational system of forestry will ever bring back to those hilltops again the magnificent pines which once adorned them. Nature has been too badly treated. The soil which slumbered upon those slopes at creation's dawn has sifted to the valleys and the floods have carried it away to the sea. Nothing now remains but sterile rocks which bake in the glaring rays of the torrid sun.

Speaking of the wholesale destruction of forests and the difficulties often encountered in getting trees to grow again upon the same mountains reminds me of an example to the point which I once met with in Germany. Some years ago I spent several weeks in the old university town of Jena. On one of the hills above that city, on the 14th of October, 1806, Napoleon fought and won the great battle of Jena. Many of those hills consist of white cliffs devoid of vegetation, and I was informed that something like 125 years ago, when the poet Goethe was finance minister of the little state of Weimar, the forests about Jena were cut down in order to create funds for a depleted exchequer. No steps were taken at that time to replant what was removed, and although within recent years many attempts have been made to nurture trees upon those barren hills, no practical results have been achieved.

The husbanding of the resources of a country is a task which is fraught with the deepest consequences to the welfare of the people who inhabit it. Unless our people wish to see the mountains of Pennsylvania, Maine, North Carolina, Arkansas, and Oregon as barren and as sterile of production as are the bluffs above the city of Jena or the mountains which skirt the coast of Asia Minor, then it is high time that something radical be done.

But if the forests have been razed from many mountains in Asia Minor, there still slumber beneath untouched mines of every description which promise fabulous wealth, and this compensates in some degree for the loss of wealth in other directions.

LESSONS FROM CHINA*

IF there is any one duty which more than another we owe it to our children and our children's children to perform at once it is to save the forests of this country, for they constitute the first and most important element in the conservation of the natural resources of the country. There are, of course, two kinds of natural resources. One is the kind which can only be used as part of a process of exhaustion; this is true of mines, natural oil and gas wells, and the like. The other, and, of course, ultimately by far the most important, includes the resources which can be improved in the process of wise use; the soil, the rivers, and the forests come under this head.

Any real civilized nation will so use all of these three great national assets that the nation will have their benefit in the future. Just as the farmer, after all his life making his living from his farm, will, if he is an expert farmer, leave it as an asset of increased value to his son, so we should leave our national domain to our children, increased in value and not worn out.

There are small sections of our own country, in the East and in the West, in the Adirondacks, the White Mountains and the Appalachians, and in the Rocky Mountains, where we can already see for ourselves the damage in the shape of permanent injury to the soil and the river systems which comes from reckless de-

* From President Roosevelt's message to Congress, December 8, 1908.

forestation. It matters not whether this deforestation is due to the actual reckless cutting of timber, to the fires that inevitably follow such reckless cutting of timber, or to reckless and uncontrolled grazing, especially by the great migratory bands of sheep, the unchecked wandering of which over the country means destruction to forests and disaster to the small home-makers, the settlers of limited means.

Short-sighted persons, or persons blinded to the future by desire to make money in every way out of the present, sometimes speak as if no great damage would be done by the reckless destruction of our forests. It is difficult to have patience with the arguments of these persons. Thanks to our own recklessness in the use of our splendid forests, we have already crossed the verge of a timber famine in this country, and no measures that we now take can, at least for many years, undo the mischief that has already been done.

But we can prevent further mischief being done; and it would be in the highest degree reprehensible to let any consideration of temporary convenience or temporary cost interfere with such action, especially as regards the national forests which the nation can now, at this very moment, control.

DEVASTATION OF OLD WORLD

All serious students of the question are aware of the great damage that has been done in the Mediterranean countries of Europe, Asia, and Africa by deforestation. The similar damage that has been done in eastern Asia is less well known.

A recent investigation into conditions in North China by Mr Frank N. Meyer, of the Bureau of Plant Industry of the United States Department of Agriculture, has incidentally furnished in very striking fashion proof of the ruin that comes from reckless deforestation of mountains, and of the further fact that the damage once done may prove practically irreparable.

Not many centuries ago the country of northern China was one of the most fertile and beautiful spots in the entire world and was heavily forested. We know this, not only from the old Chinese records, but from the accounts given by the traveler Marco Polo.

He, for instance, mentions that in visiting the provinces of Shansi and Shensi he observed many plantations of mulberry trees. Now there is hardly a single mulberry tree in either of these provinces, and the culture of the silkworm has moved farther south, to regions of atmospheric moisture.

As an illustration of the complete change in the rivers, we may take Polo's statement that a certain river, the Hun Ho, was so large and deep that merchants ascended it from the sea with heavily laden boats; today this river is simply a broad sandy bed, with shallow, rapid currents, wandering hither and thither across it, absolutely unnavigable.

But we do not have to depend upon written records. The dry wells and the wells with water far below the former water-mark bear testimony to the good days of the past and the evil days of the present.

Wherever the native vegetation has been allowed to remain, as, for instance, here and there around a sacred temple or imperial burying ground, there are still huge trees and tangled jungle, fragments of the glorious ancient forests. The thick, matted forest growth formerly covered the mountains to their summits.

All natural factors favored this dense forest growth, and as long as it was permitted to exist the plains at the foot of the mountains were among the most fertile on the globe and the whole country was a garden. Not the slightest effort was made, however, to prevent the unchecked cutting of the trees or to secure reforestation.

DESTRUCTION THROUGH AGES

Doubtless for many centuries the tree-cutting by the inhabitants of the mountains worked but slowly in bringing about the changes that have now come to pass; doubtless for generations the inroads were scarcely noticeable. But there came

a time when the forest had shrunk sufficiently to make each year's cutting a serious matter, and from that time on the destruction proceeded with appalling rapidity; for of course each year of destruction rendered the forest less able to recuperate, less able to resist next year's inroad.

Mr Meyer describes the ceaseless progress of the destruction even now, when there is so little left to destroy. Every morning men and boys go out armed with mattox or axe, scale the steepest mountain sides and cut down and grub out, root and branch, the small trees and shrubs still to be found. The big trees disappeared centuries ago, so that now one of these is never seen save in the neighborhood of temples, where they are artificially protected; and even here it takes all the watch and care of the tree-loving priests to prevent their destruction.

Each family, each community, where there is no common care exercised in the interest of all of them to prevent deforestation, finds its profit in the immediate use of the fuel which would otherwise be used by some other family or some other community. In the total absence of regulation of the matter in the interest of the whole people, each small group is inevitably pushed into a policy of destruction which cannot afford to take thought for the morrow.

This is just one of those matters which it is fatal to leave to unsupervised individual control. The forests can only be protected by the state, by the nation, and the liberty of action of individuals must be conditioned upon what the state or nation determines to be necessary for the common safety.

The lesson of deforestation in China is a lesson which mankind should have learned many times already from what has occurred in other places. Denudation leaves naked soil; then gullying cuts down to the bare rocks; and meanwhile the rock-waste buries the bottom lands. When the soil is gone men must go, and the process does not take long.

DESOLATION AFTER SPOLIATION

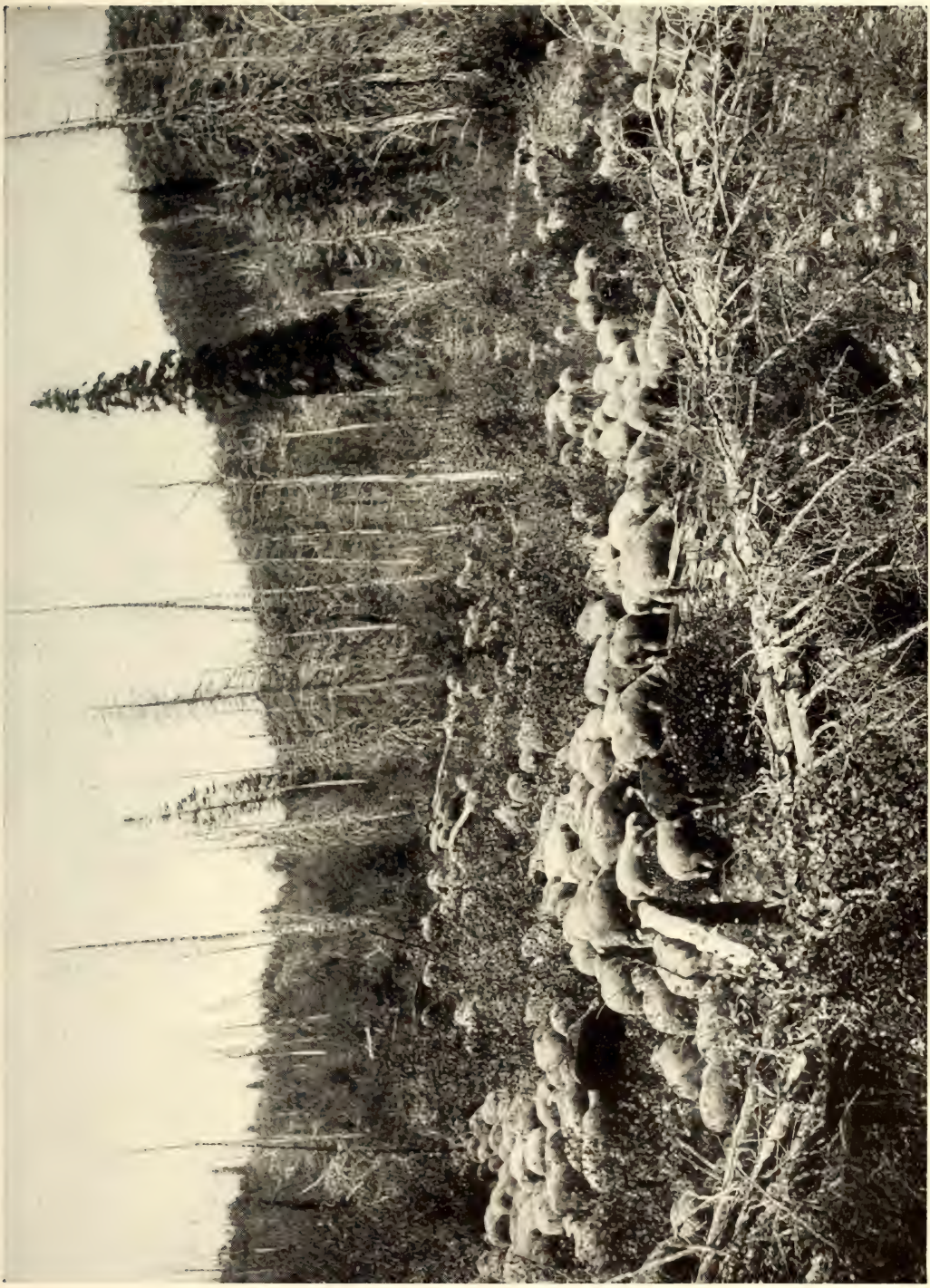
This ruthless destruction of the forests in northern China has brought about, or has aided in bringing about, desolation, just as the destruction of the forests in central Asia aid in bringing ruin to the once rich central Asian cities; just as the destruction of the forests in northern Africa helped toward the ruin of a region that was a fertile granary in Roman days. Short-sighted man, whether barbaric, semi-civilized, or what he mistakenly regards as fully civilized, when he has destroyed the forests, has rendered certain the ultimate destruction of the land itself.

In northern China the mountains are now absolutely barren peaks. Not only have the forests been destroyed, but because of their destruction the soil has been washed off the naked rock.

The terrible consequence is that it is impossible now to undo the damage that has been done. Many centuries would have to pass before soil would again collect, or could be made to collect, in sufficient quantity once more to support the old-time forest growth. In consequence the Mongol desert is practically extending eastward over northern China.

The climate has changed and is still changing. It has changed even within the last half century, as the work of tree destruction has been consummated. The great masses of arboreal vegetation on the mountains formerly absorbed the heat of the sun and sent up currents of cool air which brought the moisture-laden clouds lower and forced them to precipitate in rain a part of their burden of water. Now that there is no vegetation the barren mountains, scorched by the sun, send up currents of heated air which drive away instead of attracting the rain clouds, and cause their moisture to be disseminated.

In consequence, instead of the regular and plentiful rains which existed in these regions of China when the forests were still in evidence, the unfortunate inhabitants of the deforested lands now see their crops wither for lack of rainfall,



SHEEP ON OUR NATIONAL FORESTS

Photo from U. S. Forest Service

Photo from U. S. Forest Service

SHEEP FROM A NATIONAL FOREST RESERVE BUNCHED AFTER SHEARING

Photo from U. S. Forest Service

VIEW SHOWING SHEEP GRAZING ON BURNT AND CUT-OVER AREA OF THE FOREST WHERE GRASS HAS RECOVERED: UNITA NATIONAL FOREST, UTAH

Photo from U. S. Forest Service

LOOKING DOWN OFF OF MESA OR HEAD OF LOG CHUTE ON THE M'ALPINE TIMBER SALE: MONTEZUMA NATIONAL FOREST, COLORADO

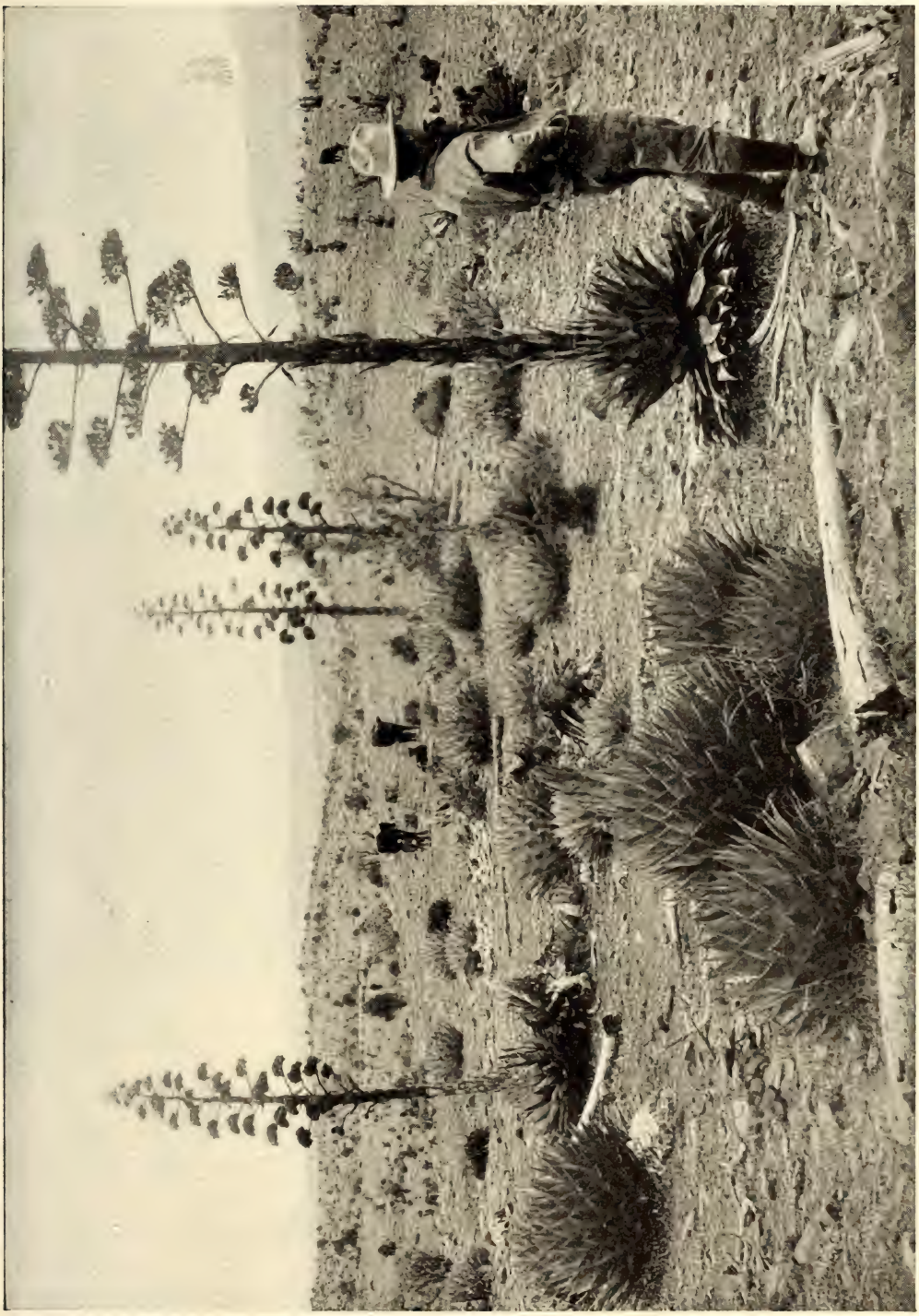


Photo from U. S. Forest Service

STOCK RANGE BELOW TIMBER LINE SIX MILES NORTH OF SILVER CITY: GILA NATIONAL FOREST, NEW MEXICO

Photo from U. S. Forest Service

PILING BRUSH ON CUT-OVER AREA OF THE COOPER AND COLLIER TIMBER SALE: MONTEZUMA NATIONAL PARK, COLORADO

Photo from U. S. Forest Service

A FOREST AREA WHICH HAS BEEN BURNED OVER AFTER LUMBERING AND HEAVILY GRAZED BY SHEEP

View shows size and density of the original forest, the barren soil, absence of seed trees, no reproduction. A slope that can be planted. Salt Lake county, Utah

A FOREST RANGER'S CABIN, BEAR CANYON STATION: GILA NATIONAL FOREST, NEW MEXICO

while the seasons grow more and more irregular; and as the air becomes dryer certain crops refuse longer to grow at all. That everything dries out faster than formerly is shown by the fact that the level of the wells all over the land has sunk perceptibly, many of them having become totally dry.

In addition to the resulting agricultural distress, the watercourses have changed. Formerly they were narrow and deep, with an abundance of clear water the year around; for the roots and humus of the forests caught the rainwater and let it escape by slow, regular seepage. They have now become broad, shallow stream beds, in which muddy water trickles in slender currents during the dry seasons, while when it rains there are freshets, and roaring muddy torrents come tearing down, bringing disaster and destruction everywhere.

NEVER MORE TO BLOOM AGAIN

Moreover, these floods and freshets, which diversify the general dryness, wash away from the mountain sides, and either wash away or cover in the valleys, the rich, fertile soil which it took tens of thousands of years for Nature to form; and it is lost forever, and until the forests grow again it cannot be replaced.

The sand and stones from the mountain sides are washed loose and come rolling down to cover the arable lands, and in consequence, throughout this part of China, many formerly rich districts are now sandy wastes, useless for human cultivation and even for pasture. The cities have been, of course, seriously affected, for the streams have gradually ceased to be navigable.

There is testimony that even within the memory of men now living there has

been a serious diminution of the rainfall of northeastern China. The level of the Sungari River in northern Manchuria has been sensibly lowered during the last fifty years, at least partly as the result of the indiscriminate cutting of the forests forming its watershed.

Almost all the rivers of northern China have become uncontrollable and very dangerous to the dwellers along their banks as a direct result of the destruction of the forests. The journey from Peking to Jehol shows in melancholy fashion how the soil has been washed away from whole valleys, so that they have been converted into deserts.

In northern China this disastrous process has gone on so long and has proceeded so far that no complete remedy could be applied. There are certain mountains in China from which the soil is gone so utterly that only the slow action of the ages could again restore it, although, of course, much could be done to prevent the still further eastward extension of the Mongolian desert if the Chinese government would act at once.

LESSON FOR AMERICA

What has thus happened in northern China, what has happened in central Asia, in Palestine, in North Africa, in parts of the Mediterranean countries of Europe, will surely happen in our country if we do not exercise that wise forethought which should be one of the chief marks of any people calling itself civilized. Nothing should be permitted to stand in the way of the preservation of the forests, and it is criminal to permit individuals to purchase a little gain for themselves through the destruction of forests when this destruction is fatal to the well-being of the whole country in the future.

THE VALUE OF THE UNITED STATES FOREST SERVICE

MASTERY by the Forest Service of one of the greatest practical forest problems ever undertaken by any government is advancing apace. Briefly stated, that problem is to develop to its highest usefulness a total area of 168,000,000 acres of wild lands, mainly mountain wilderness, but closely related to the welfare of the entire country.

From an administrative standpoint the most striking fact of the year was the remarkable increase which took place in the actual use of the forests by the public. This increase is partly brought out by the following statement:

	Per cent
Increase in area	11
Increase in number of timber sales	236
Increase in amount of timber cut	102
Increase in number of free-timber permits	76
Increase in number of special-use permits	67
Increase in number of grazing permits	11

Regarded as property, the national forests justify liberal expenditures for their protection and improvement. At $2 per thousand feet stumpage the merchantable timber alone forms, just as it stands, an asset worth something like $800,000,000, while the very moderate grazing charge yielded the government last year an income of nearly $1,000,000. It is a safe prediction that within twenty years the forests will bring in from the sale of timber alone an annual net income of as many millions of dollars.

An average wood production of 30 cubic feet to the acre of commercial forest is a moderate estimate of what will ultimately be obtained under management. One hundred million acres of such forest would allow to be cut each year over 3,000,000,000 cubic feet, or from 20,000,000,000 to 25,000,000,000 board feet, without diminution of the supply. This is but a fraction of the country's consumption of wood at the present time, but at the stumpage prices which already obtain in the older and better settled parts of the United States its sale would bring the government each year from $80,000,000 to $125,000,000.

Were it wise to do so, the receipts

TWO HUNDRED SQUARE MILES OF ONCE WOODED MOUNTAINS IN CHINA WHICH A CENTURY AGO PAID RICH REVENUE ON THEIR LUMBER PRODUCT

Locality: District of Fou-ping, Chili Province, China. View from the top of a mountain 2,000 feet high, looking down on adjacent hills and valleys. Photo by Bailey Willis.

FARMING IN THE PATH OF THE FLOOD

Locality: District of Wu-t'ai-shan, northern Shan-si Province, China. A valley at the base of the mountains which during the spring rains is covered by flood waters. The stone walls catch some of the sediments and crops are grown on the soil thus saved. Photo by Bailey Willis.

Photo from U. S. Forest Service

A FOREST RANGER SCALING LOGS AT THE HEAD OF LOG CHUTE: M'ALPINE TIMBER SALE, MONTEZUMA NATIONAL FOREST, COLORADO

from the forests could very easily be made not only to keep pace with the expenditures, but to return to the government the entire cost of maintaining the Forest Service. Private owners of grazing lands in the same regions ask and receive a very much higher return per head of stock for the use of their lands than does the Forest Service. The national forests, which contain one-fifth of the standing merchantable timber in the country, furnished last year about 1.3 per cent of its lumber cut, resulting in the removal from the forests of about one-eighth of 1 per cent of the stand. Of this comparatively insignificant amount cut, one-fourth was not sold, but was given to home-builders and communities; yet the sales brought in nearly $900,000. If the chief object of the forests were to produce immediate income, the amount received could be multiplied several times. There is actually going to waste in the woods each year, through decay and other natural causes, from five to ten times the amount of timber now being cut.

With an adequate force of forest officers available much of this waste might be prevented. Timber sales involve, for marking, scaling, and supervising the work, a cost to the government of about 30 cents per thousand feet, and the amount sold cannot be much increased without an increased appropriation. There is also the waste of the productive power of the forest, which cannot be brought into full play until the mature trees have been removed to make room for a growing crop.

Photo from U. S. Forest Service

COOKING POISON TO POISON WHEAT FOR EXTERMINATING PRAIRIE DOGS: DENVER, COLORADO

The little prairie dog is a serious pest in certain localities of the United States. The Biological Survey has shown how they may be destroyed by poison, with the result that the Forest Service is able to check their mischief on the ranges.

Most of the national forest timber is beyond reach unless heavy outlays are made to obtain means of transportation. Such timber can be sold only to those who command large resources of capital, and even then only at a relatively low price. On the other hand, where the demand for the timber is good and competition for its purchase fairly brisk, it is generally necessary to go slowly because of the certainty of future requirements. In short, the question of the timber that can safely or wisely be sold is a local one. The fact that timber is rotting in the woods in distant regions will not help communities which find their home supply exhausted.

THE NATIONAL FORESTS PREVENT A "TIMBER" TRUST

For these reasons the sales of national forest timber are carefully guarded. The amount of national forest timber sold during the year was slightly over 386,000,000 feet, or not much over one-third the amount sold the previous year. The falling off was directly due to the refusals to make large sales. Under such sales the actual cutting is allowed to extend over several years. The amount of timber cut and paid for during the year, however, more than doubled the cut of the previous year, with a total of not quite 393,000,000 feet. The receipts from timber sales were about $850,000, as against not quite $670,000 for the previous year. In addition there was cut under free use over 130,000,000 feet of timber, valued at about $170,000.

The timber lands of the West, outside of the national forests, are mainly in strong hands. Were the national forest timber offered on the market to every purchaser, the main scene of western

Photo from U. S. Forest Service

MIXING THE POISON AND WHEAT: DENVER, COLORADO

lumbering would be quickly shifted to the public holdings. It is sometimes asserted that the creation of the national forests has played into the hands of monopolists of timber lands. It was, on the contrary, an eleventh-hour halting of the process which would soon have made the hold obtainable by such a monopoly complete. To permit the owners of standing timber to preserve their stumpage intact while supplying their business needs through purchases from the government would simply invite the hoarding of private timber for further high prices, while the public supply would be disposed of without an adequate return.

Under the timber-sale policy now in force both the present and the future interests of the consumer are borne in mind. The needs of those dependent on the forests are supplied up to the limit set by the power of the region to maintain a steady yield. It is recognized, also, that the removal of mature timber to make room for a new and growing crop is the only way by which the forests can be put to work. Small sales are, however, preferred to large sales, and large sales which would tend to expose the consumer to monopoly prices are uniformly refused. Requests made by prospective bidders for the advertising of

DRYING THE POISONED WHEAT: DENVER, COLORADO

Photos from U. S. Forest Service

DISTRIBUTING PRAIRIE DOG POISON ON THE RANGES

Photo from U. S. Forest Service

FOREST SERVICE MEN ON THE FIRE LINE

over $2,400,000 worth of timber were refused during the past year.

One result of this policy has been to bring about a decline in the average price of stumpage sold. In general higher prices are obtainable through large than through small sales. The most important consideration in making sales of timber, however, is not the price obtainable, but the serving of the public interest. Obviously, to sell timber in quantity at less than the market price through any other method than competitive bids would simply work to the profit of specially favored individuals; but care must be taken at the same time both to prevent local consumers from being overcharged by those who buy stumpage from the government, and to prevent the exaction of a monopoly price for stumpage by the government.

SMALL LOSSES FROM FIRE

The work completed during the year included 3,400 miles of trails, 3,200 miles of telephone line, 100 miles of wagon road, 40 miles of fire line, 250 bridges, 550 cabins and barns, and 600 miles of pasture and drift fences. In addition to the sum provided by the special-improvement fund, over $100,000 from the general fund of the service was turned from current expenses to defray the cost of this work, but much of the work planned and urgently needed could not be carried out because there was nothing with which to pay for it.

The fire record also deserves mention. Since the fiscal year ends in the midst of the fire season, reports of fires are made not for fiscal but for calendar years. During the calendar year 1907 the loss of timber by fire was less than half that of the previous year, though this in turn was less than ever before. About one-seventh of 1 per cent of the forests was burned over in 1907, with a damage so slight as to be practically negligible. The ratio of loss to the value of the timber protected, allowing that it

Photo from U. S. Forest Service

BUILDING FIRE LINE AROUND A BLAZE IN HELENA NATIONAL FOREST, MONTANA

is worth $2 per thousand feet, was about as 4 cents to $1,000. The entire cost of national forest administration was equivalent to a charge of one-third of 1 per cent on the value of the timber protected—surely a cheap insurance rate.

This immunity from fires must be ascribed chiefly to the results of the consistent efforts made in the past to inform the public as to the danger of carelessness in the use of fires in the forest and to the recognized necessity of vigilance to put out small fires. With reasonable coöperation on the part of the public to prevent fires and reasonable provision for discovering and fighting fires when they start, really heavy losses are entirely preventable. The widespread forest fires of recent months are a case in point. Relatively little damage was done to the national forests at a time when the air was thick with smoke almost from the Atlantic to the Pacific coast, and most of the national forest loss which was suffered, amounting to perhaps $1,000,000, was due solely to the fact that the area to be protected is so vastly out of proportion to the resources at the disposal of the Forest Service.

Examinations of lands under the act of June 11, 1906, led to the listing for settlement of about 240,000 acres of national forest land.

IMPROVING THE FORESTS AND RANGES

Reforesting of large areas of the national forests is called for primarily in the interest of the water supply of the West, but also, though less pressingly, for the sake of an enlarged timber supply. Broadcast sowings were made during the year in 27 forests, in 8 states, to test by experiment the extent to which reforestation may be hoped for through the use of this method. The national forest nurseries, in which are being grown stock for transplanting, were enlarged and about 700,000 trees were planted. Over 2,000,000 trees will be ready for planting in 1909.

Photo from U. S. Forest Service

CLOSE GROUP OF YOUNG REDWOODS SURROUNDED BY WHITE FIRS

Eleven Sequoias on one-third acre 6, 5, 5, 8, 7, 5, 6, 7, 3, 5, 4 feet in diameter and measuring about 240 feet tall. Sequoia National Park, California. Note the man standing at base of the central tree.

Photo from U. S. Forest Service

TURPENTINING: EMPTYING THE CARRYING BUCKET: OCILLA, GEORGIA

The illustration shows how recklessly the trees are chopped by ignorant workmen

Photo from U. S. Forest Service

GENERAL GRANT: BIG TREE, 106 FEET IN CIRCUMFERENCE, CALIFORNIA

The beneficial results of regulated grazing, shown in a decided betterment of much of the national forest range, made it possible to increase the allotment of stock on a number of the older forests. At the same time investigations in range improvement through reseeding, new methods of handling stock, the eradication of poisonous plants, and the destruction of prairie dogs brought important progress toward still better future use of the forests by stockmen. The development of watering places is another means that is being pursued to the same end, while the killing of predatory wild animals by forest service hunters saved the stockmen losses probably greater than the entire amount paid in grazing fees. This amount was over $960,000. Through the enforcement of quarantine regulations and the distribution of blackleg vaccine other losses from disease were prevented.

Through coöperation with private owners investigations in forest management and forest planting were continued. It was possible to make field examinations of only about one-fifth of the total acreage for which advice concerning forest management was sought. Every tract of land on which the advice of the Service is applied becomes a valuable experiment in practical forestry. The total area for which examinations have been made since coöperation was first offered is nearly 11,000,000 acres, and on more than three-fourths of this some form of forestry is now in actual practice.

The studies in wood preservation and in the strength and physical properties of different kinds of wood maintained the position of the Forest Service as leader toward more economical use of wood material. Special attention was given to working out practicable methods for treating farm timbers in small quantities. Studies in wood pulp-making showed that a merchantable pulp can be made from 15 woods not commonly used. Along many other lines also data were gathered looking to better knowledge and control of our forests and better use of their products. At the same time the work of bringing to the attention of the public the knowledge gathered for the use of the public was vigorously prosecuted.

LARGE FALLEN CHESTNUT IN THE APPALACHIANS

AN AMERICAN ELM

Photos from U. S. Forest Service

THE EMANCIPATION OF MOHAMMEDAN WOMEN

By Mary Mills Patrick, Ph. D.

President of the American College for Girls at Constantinople

WOMEN in the harems have been an unknown quantity to the outside world during the ages that have past. Their lives have been shrouded in mystery. In the streets they have been concealed behind thick veils and flowing draperies, and hidden behind heavy curtains and latticed windows in their homes.

Until the 23d of July last Constantinople was like a medieval city. In fact, it was the only city in Europe which had remained wholly without the outward appurtenances of modern civilization. There were neither electric cars, local post, telephones, nor sewage system. Thousands of dogs acted as scavengers in the irregular and badly paved streets. Rising above this medley of Oriental life, the slender minarets of hundreds of mosques pointed to the golden sky.

In this curious setting the women of the harems stood out as the most interesting feature of Mohammedan life. The silent, heavily draped figures, threading their way in and out of the streets, bazars, and shops, seated motionlessly in their caiques on the Bosphorus, or dimly seen behind latticed windows, filled the place with mysterious life. But on the 24th of July all this was changed, as in the twinkling of an eye, by the wonder-working revolution, which was the result of long years of preparation by the Young Turkey party. It brought instant freedom to all classes in Turkey.

Mohammedan women on that day became free. The outward manifestation of this freedom will, from the nature of the case, be somewhat gradual, but morally their freedom has been complete since the Constitution was announced. They played an important part in the bloodless revolution of July 24. The makers of New Turkey live mostly abroad, but the Society of Union and Progress penetrated every town and village in the Turkish Empire.

Espionage was so severe that prominent men did not dare to meet together to discuss plans. They could not even give two dinner parties in succession without exciting suspicion. It was the women who overcame this difficulty. Thousands of letters containing the plans for the *coup d'etat* of July 24 were patiently carried back and forth between the members of the Society of Union and Progress by them. They were handed from one woman to another, and secretly given to the husbands as they met each other in the streets and in the shops, apparently innocent of any political scheming. A few Turkish women managed to evade the law against leaving the country, and went to Paris and other places to openly assist in the organization of the Young Turkey party. Yet most of their aid was given in secret. All through Albania, Macedonia, and the Turkish Empire Mohammedan women have been alive to every step of progress made.

TURKISH WOMEN FOR CENTURIES HAVE BEEN ABLE TO HOLD PROPERTY INDEPENDENTLY OF THEIR HUSBANDS—RIGHTS WHICH NO GERMAN WIFE EVEN YET POSSESSES

The training of Mohammedan women through the long centuries that have passed has fitted them to take an active and effective part in political affairs. The life of the women in the harems has been anomalous; slaves on the one hand, whose value and happiness depended largely upon their beauty and ability to please a master who could divorce them by a single word, but on the other hand

they have enjoyed privileges which women of other nations have struggled for centuries to obtain.

It was believed by the followers of Mohammed, the Prophet of Islam, that the Koran, which was a collection of his sayings, would be able to deal adequately with all the legal aspects of society. It was soon found that many questions arose to which no reference could be found in the Koran. Under these circumstances an additional code of laws was necessary. The caliphate had been transferred from Mecca to Bagdad, and the leading Mohammedans, seeking for a model on which to base their code, turned to the Roman emperors at Constantinople and adopted in a modified form the Code of Justinian.

It is a well known fact that Roman law regarded the rights of the individual without consideration of sex; a man or a woman was alike a citizen of the Roman world. This met the requirements of Mohammedan life, where no woman ever necessarily sustained a lasting relation with any man.

Therefore, during all the centuries of Mohammedan history, women have legally controlled their own property. They have been free to buy, sell, or alienate it without consulting any male relative. This has given them independence of thought and an influence in business affairs that seems wholly inconsistent with their life of comparative personal slavery.

Enter a harem and there you see a Circassian beauty, who has been newly acquired by the tall, handsome pasha who has just passed you in the street. The air is heavy with the odor of Eastern perfumes, and the black eunuch stands by the door to watch all who come and go. The beauty herself is thickly powdered, with an elaborate coiffure erected by her numerous maids. Jewels half cover her arms, and she wears a beautifully embroidered negligée. There is a languorous expression in her black eyes, as she sits idly smoking a cigarette and sipping Turkish coffee. Would you think, to look at her, that when she draws her money from the bank that she must sign her own check? These two sides of life have been wholly at variance with each other; but, as years have gone by, the thoughtful side has predominated among the more intellectual Mohammedan women, until now they are ready to enter into the affairs of today with an understanding and vigor which the world has never accredited to them.

It has been on the social side that Mohammedan women have suffered most under the oppression of the last thirty years, especially from the frequency of divorce. A man could legally divorce his wife at any minute, the only condition being the payment of the dowry which was settled upon her by the husband at the time of her marriage.

In the last attempt to keep the sex in the rôle assigned to them by the life of the harem, very strict laws have been made to prevent all possible progress among them. Laws have been proclaimed over and over again forbidding Mohammedan women to attend foreign schools. In this emergency they engaged governesses. Most of these governesses were French, and many of them were inefficient, and bad moral guides to so large a portion of the population beginning to think and question. The governess system obtained so much influence after a short time that laws were made forbidding women to have governesses. Yet they struggled on in an effort for mental illumination, reading, writing, talking things over among themselves, and sometimes getting help from their husbands and brothers. They have accomplished much, with so heavy a handicap, in literature, science, commerce, and politics.

WOMEN WHO ARE WRITERS

The extreme censorship of the press has kept the best efforts of the Mohammedan women from the knowledge of the public. They have studied languages, written for the papers, and published books. It is not an uncommon thing to meet a veiled Mohammedan

woman on one of the steamers that ply along the Bosphorus, and to find on speaking to her that she is familiar with English, French, and German, and perhaps Italian.

Mohammedan women have a rich inheritance in the realm of letters. Since the days of Mohammed the Conqueror, woman have from time to time belonged to the literary circles of Mohammedan society. Mohammedans have their own Sappho, a poetess who lived in the fifteenth century, and who says:

"Since they say that woman lacketh wit alway,
Needs must they excuse whatever word she say.
Better far one woman, if she worthy be,
Than a thousand men, if all unworthy they."

Her name was Mihri, and she was the author of a volume of poetry which compares well with the work of her contemporaries.

During the last twenty-five years there have been many women writers in Constantinople. Niguar Hanum has produced several volumes of poetry which have contributed greatly to the development of Turkish lyric poetry. Alieh Hanum has written on philosophy, ethics, and the Mohammedan religion. Many other women have written along different lines—essays, romances, and newspaper articles.

The literature of the Turkish nation is concealed from the rest of the world by the difficulties of the Turkish language. The language in itself would not be difficult, but it is unfortunately written in the Arabic characters. Arabic possesses no vowel system, and books and papers published in the characters are fully as difficult as the English language would be published in shorthand. In fact, in reading Arabic a person must have a fair idea of what it is about before he can make anything out of it. If, among the present reforms introduced into Turkey by the Society of Union and Progress, the Latin alphabet could be substituted for the Arabic, Turkish language and literature would become more accessible to the rest of the world.

TURKISH MIDWIVES

The strict laws regarding harem life have obliged Mohammedan women to learn something of medicine. Not long ago a European doctor was passing a house with latticed windows, when he heard violent, heart-rending screams from within. He stopped, spoke to the porter, and asked him what the trouble was. The porter replied, "My mistress is very ill."

"Go and tell your master," said the doctor, "that I am a physician and I will come in immediately to help her."

The porter disappeared, but soon returned, saying, "My master says he would rather the mistress would die than see a man doctor."

This is an extreme case, as men doctors have been admitted for several years into many Turkish houses. Yet there are thousands of homes in the Mohammedan world where a man doctor would not be allowed to enter under any consideration.

As a result, there has developed a more or less medieval system of midwifery. The midwife is called a half-doctor. Fifty years ago this class was made up of ignorant women who practiced charms, dealt in strange drugs, and produced much suffering in the harems. Turkey, however, has made progress in the science of medicine, and in this progress women have shared. The so-called half-doctor has become somewhat better educated from year to year, until a place has been given to her in the program of the new Mohammedan Medical College erected at Haidar Pasha, in Constantinople. The catalogue of this institution announces weekly lectures for women, and Mohammedan women who have finished the course of study assist in the demonstrations at these lectures. Laws have been made requiring all who practice as half-doctors to have regular diplomas from the government. Women in this capacity have for several years constituted a regular profession, whose members obtain an annual income of from one to two thousand dollars. On

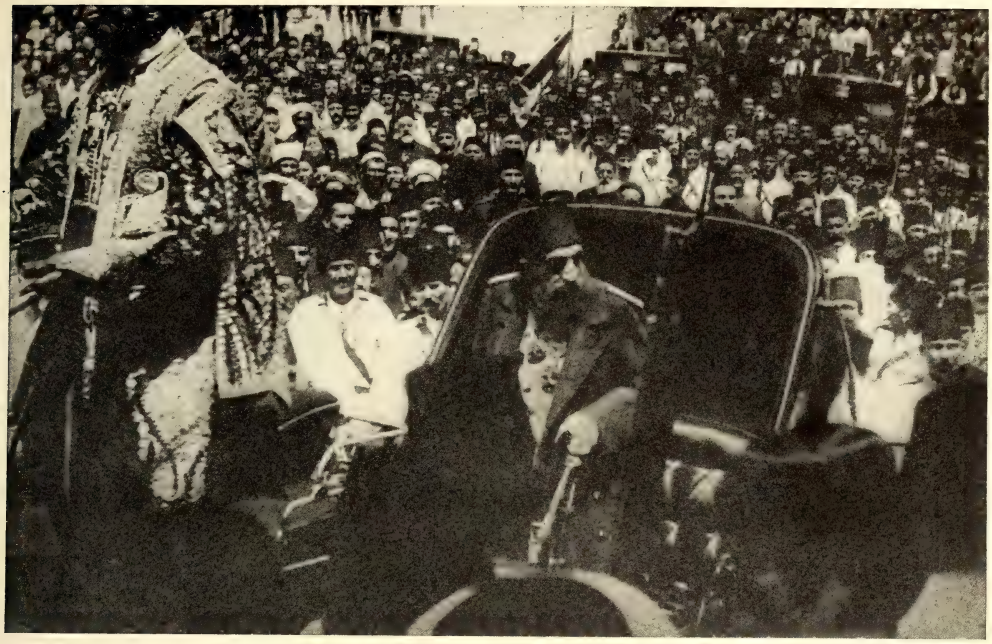


Photo from Mary Mills Patrick

THE SULTAN OF THE OTTOMAN EMPIRE GOING TO MOSQUE THE DAY AFTER THE CONSTITUTION WAS ANNOUNCED

one occasion when the girls in a certain school in Stamboul were to be vaccinated a half-doctor was called in. The Turkish government has until the present time refused the full doctor's diploma to foreign women who have desired to practice in the empire, the only exception being an American physician, Dr Mary Eddy, who is practicing in Syria. The medical profession will be one of the first for Turkish women to enter under the new regime.

From time immemorial the complex assembly of women in the palace of the Sultan have had their finances controlled by a woman, who keeps under her a number of secretaries or scribes, as they are called, who are also women. In the beginning this office was held by the Validé Sultana, or mother of the Sultan, who always holds a high position in the palace. At the present time the woman in control is called the Treasurer of the Harem.

The harem of the Sultan of Turkey has usually contained several hundred women, who are privileged to drive about under careful espionage, to visit the leading shops of the city, and to invest freely in silks, laces, and jewels. The control of the finances of so large a number of women, who are allowed to spend such large sums of money, has never been a small matter and shows the ability of Mohammedan women along commercial lines.

Women of the lower classes, old enough to travel somewhat freely within the limits of the Turkish Empire, have organized simple systems of buying and selling, somewhat more complicated than that of a peddler, and have traveled back and forth between Egypt, Smyrna, and Constantinople, plying their trade with great success.

The most familiar example to the inhabitants of Constantinople of what a woman may be privileged to do in common commercial life may be seen at Beshiktash, a village on the Bosphorus.

CROWD AT GATE OF THE SULTAN'S PALACE THE DAY AFTER THE CONSTITUTION WAS ANNOUNCED, WAITING TO GREET HIM AS HE GOES TO MOSQUE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

TURKISH GENTLEMEN MOUNTED ON ARAB HORSES: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A VIEW OF THE OLD WALLS AND MOAT SURROUNDING THE ANCIENT CITY OF CONSTANTINOPLE

The city was besieged more than thirty times, but owing to its triple walls and huge moat, it was captured only thrice in 1,000 years: by the Venetians and Crusaders in 1203 and 1204, through treachery, and by the Turks in 1453

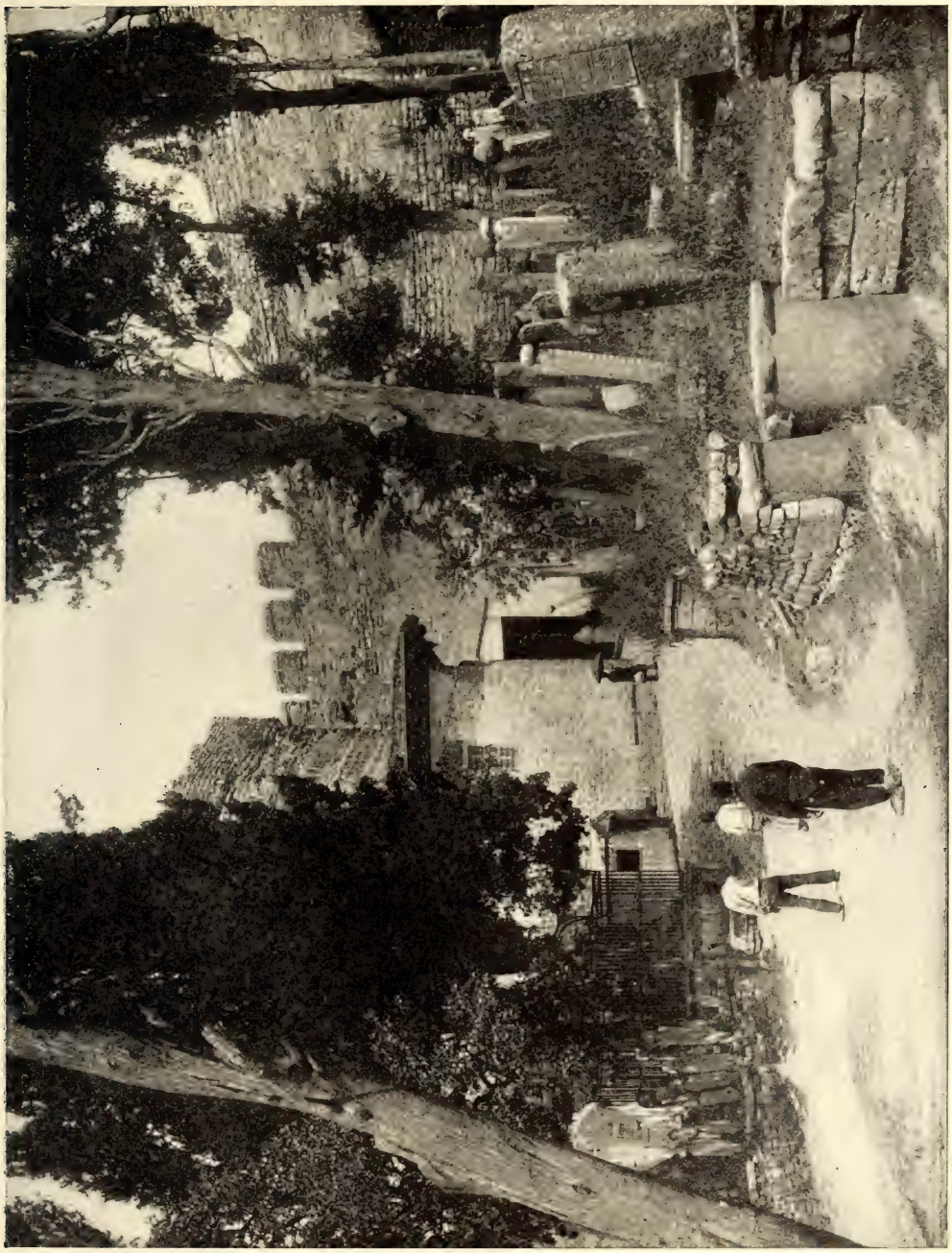


Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A CORNER OF A TURKISH CEMETERY: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

KETTLE DRUMS OF THE JANISSARIES: CONSTANTINOPLE

Whenever the Janissaries became angry with the Sultan, they would invert these huge kettles, in which their food was cooked, and beat them as signals of revolt

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

THE PLANE TREE OF THE JANISSARIES

The tree served as the gallows of ancient Constantinople. In the days when the Janissaries terrorized the city, hundreds of victims would sometimes be swinging from its branches at one time. The Janissaries were recruited from the sons of captured Christians and Jews. The boys were taken from their parents when from five to seven years old and trained by the Turks to fight and hate the race from which they had sprung. First a scourge to Eastern Europe, they later became the masters of the sultans, many of whom they deposed and slew. In 1826 the corps was wiped out by a popular insurrection led by Sultan Mahmoud the Reformer, 6,000 Janissaries being slain in one day.

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

THE GREAT FORTRESS BUILT BY MOHAMMED THE CONQUEROR, ON THE BOSPHORUS AT RUMELI HISSAR, WHERE THE STRAIT IS NARROWEST

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

THE FOUNTAIN AT THE MOSQUE OF SULTAN BAYEZID: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A TINMAN IN THE BAZAR: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A BEGGAR IN CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A STREET IN THE TURKISH QUARTER OF CONSTANTINOPLE, SHOWING THE OVERHANGING BALCONIES AND LATTICED WINDOWS

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A TURKISH BARBER: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

OPENING THE TREASURE HOUSE IN THE MORNING: CONSTANTINOPLE

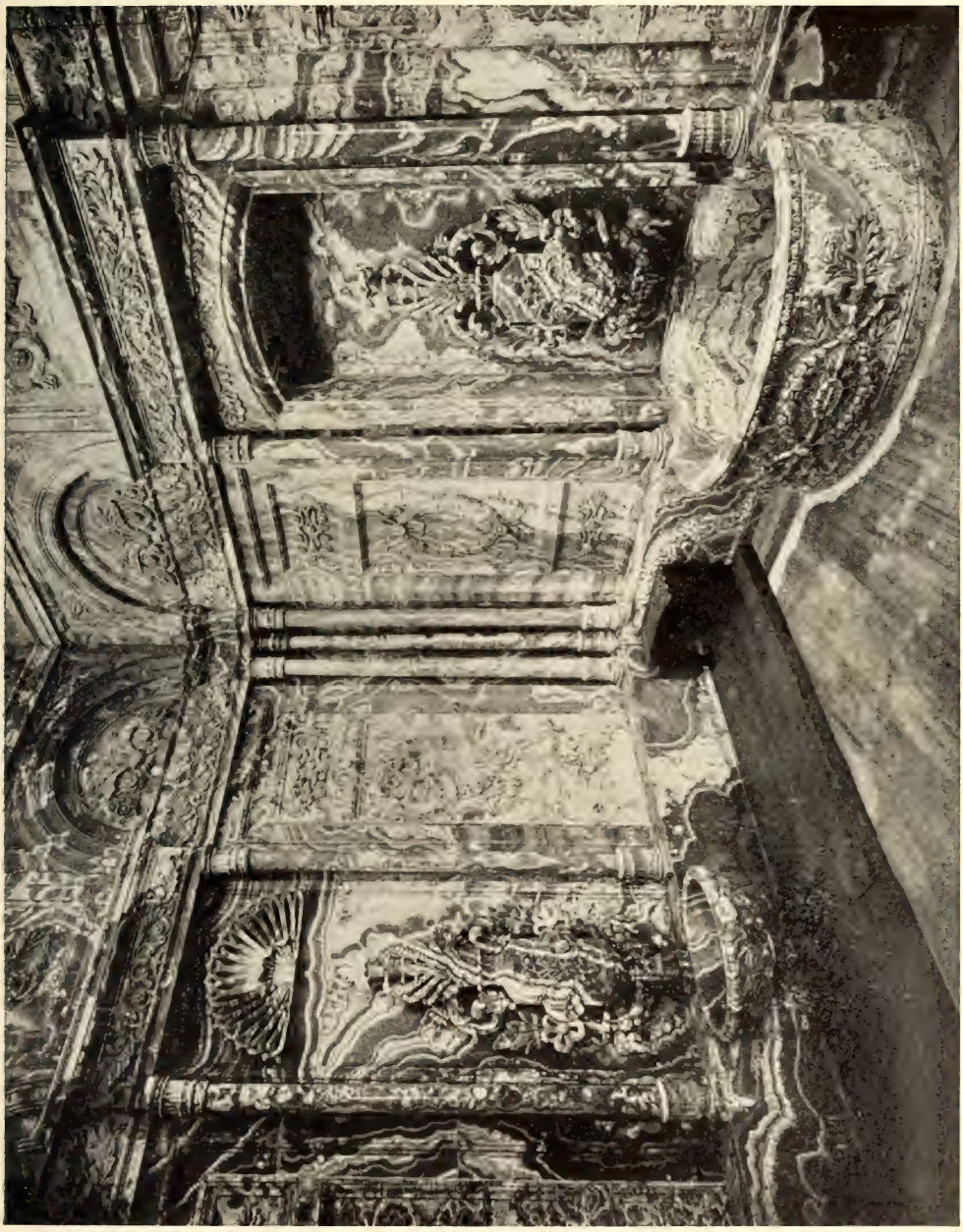


Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

THE IMPERIAL BATH-ROOM IN THE PALACE OF DOLMA BAGHTCHEH: IN CARVED ALABASTER

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

A BOOTH IN THE BAZARS OF CONSTANTINOPLE

The ferry-boats touch at this landing every few minutes, where a gaunt figure in woman's draperies marches up and down the landing, carrying a club as the sign of her office. Her duty is to marshal the women in and out from the women's waiting-room to the cabins of the steamer, for which office she is paid about $20 a month.

Mohammedan women have also made some progress in legal lines. The courts of Constantinople have always been closed to women as visitors. I know of one foreign woman who tried to visit them, and who was put out gently but firmly from one after another; yet veiled Mohammedan women were always seen congregating about the courts, and the question naturally arose, "What were they doing there?" Investigation showed that a Mohammedan woman could enter any court, even the criminal, in three different capacities—as a prisoner, as a witness, or even to plead her own cause. It has not been an unusual thing for clever Mohammedan women, when obliged to go to law over property matters, to carefully study up their own cases. They would consult attorneys beforehand and find out all the legal intricacies which might influence their particular case, and afterwards appear in court and plead it with great eloquence.

There is another profession which Mohammedan women have entered with success, viz., the profession of teaching. Schools for girls have been very elementary and badly organized in the past, yet two grades have existed almost everywhere in the Turkish Empire, with the exception of Hejaz and Yemen. There is one normal school in Constantinople, called the "Home of the Lady Teachers," which has sent out annually a class of from sixty to one hundred graduates. The law has for some years required that every teacher should possess a diploma from this normal school. Their salaries have ranged from ten to twenty-five dollars a month, according to the grade of the school.

It is interesting to note that in engaging teachers, or even in accepting students for the normal school, no attention is paid to the fact as to whether they are married or not. Marriage does not disqualify a Turkish woman from pursuing any profession; and there has been one instance at least, and probably many others, where a Turkish woman has taught school and supported her husband.

SOCIAL FREEDOM FOR THE WOMEN

Their past experience has been slowly preparing the Turkish women for the larger opportunities that the constitution gives them. On the morning of the 24th of July all classes of the Turkish Empire entered into a new life, but the greatest change of all took place in the harems. Women everywhere threw off their veils. A prominent woman in Salonica openly assisted her husband in the political celebration.

One woman went so far as to have her picture published in a Paris paper. At this the members of the Reactionary Party rose up in common protest and said, "If this is to be the result of freedom, that our women display their faces to the public with such brazen immodesty, we do not wish a constitution."

The Turkish women are true patriots, and when they saw that the question of freedom for women appeared to have such deep significance to the nation, not only from a political and social, but also from a moral point of view, they said with one accord, "Of what consequence is so small a matter as a veil! We will continue to wear our veils, and will seek the larger opportunities that the new constitution gives us." Turkish women everywhere have accordingly resumed their veils; but it is a very different thing to wear a veil voluntarily than being obliged to do so, and eventually they will probably appear in the streets without them.

The moral freedom that the revolution has brought to Turkish women is showing itself in many different lines. The freedom of the press has been offered to women. They are writing for the papers openly and without fear of

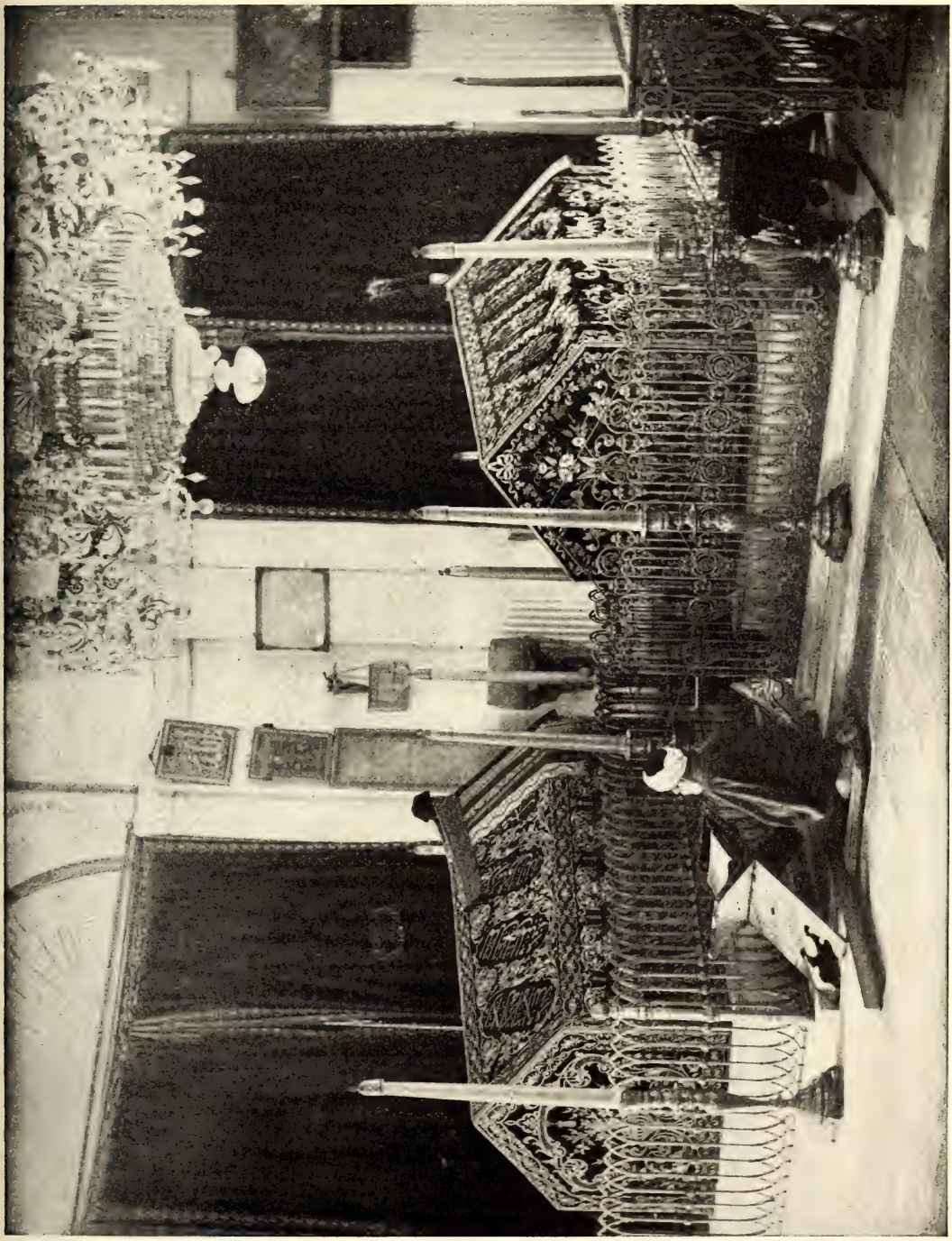
censorship, and their voices are being heard in regard to the affairs of the nation. There are three new reviews already published in Constantinople for women, and in other parts of the Turkish Empire papers for women alone are being published. A graduate of the American College for Girls living in Salonica has sent to Boston for a copy of a well-known American woman's magazine as an aid in publishing one of these papers. Women's clubs have been formed in Constantinople and in other cities, and the one thing that women all over Turkey are asking for is education. The schools for girls was one of the first subjects to be presented to the Department of Public Instruction under the new regime, in the many new journals which the freedom of the press has called forth.

There is a picturesque woman's college in Turkey which has been quietly working for the last thirty years to pave the way for the present strong movement among the women of the East in behalf of higher education. This is the American College for Girls at Constantinople, an institution which is gradually taking rank among the leading women's colleges in the world. As a result of the greater freedom of the new regime, the college has secured a large and valuable site on the European shore of the Bosphorus, an old manor park which was laid out during the luxurious days of the past and has now changed hands for the first time in a century. The college is now in Scutari, on the Asiatic shore of the Bosphorus, but it will be removed to the new site as soon as the buildings can be erected. The list of students has always contained some Mohammedan names, although the parents may have sacrificed greatly in order to defy the laws and send their daughters to a foreign college.

The college has furnished one graduate who is a leader in Constantinople at this critical time. Halideh Salih has been called once and again the first woman in popularity and influence in the Turkish Empire. Her father was Secretary in the Department of the Treasury in the palace of the Sultan, and no small sacrifice was required to enable his daughter to obtain the degree of Bachelor of Arts in a foreign college. She is the only Mohammedan woman in the Turkish Empire who holds this degree. The freedom of the new constitution has brought with it a wide recognition of her ability. She is writing for all the papers in Constantinople with much success and vigor; she is president of one of the new women's clubs and a member of all; she is a member of two men's clubs, a league for public safety, and a press club, and she has been asked by the Department of Public Instruction to outline the course of study necessary for the reorganization of schools for girls throughout the empire. Articles on this subject have already been published by her in the Turkish press. She has also prepared a translation of Julius Cæsar, a play that the censorship excluded in the past, but which has been spoken of as the first play which will probably be given in the new Turkish theater soon to be opened in Constantinople. She is also writing for foreign papers, and the first money she earned in this way was used toward founding a scholarship for Turkish girls in her alma mater.

Thus the preparation which Turkish women have had in secret for public life will enable them to take advantage of the new opportunities with great celerity; of this there are already numerous illustrations. A letter recently appeared in the *Echo,* the unofficial organ of the Committee of Union and Progress, begging for medical training for women, in response to which the leading Turkish surgeon in Constantinople has agreed to take women into his hospital for training.

The Imperial Museum of Turkey, under Hamdi Bey, the celebrated Turkish archeologist, has made great progress during the last quarter of a century, and an art school of comparative excellence has been open to men for some time in Constantinople. The women have now asked for a similar school, and



THE MAUSOLEUM OR TURBEH OF SULTAN MAHMOUD THE GREAT: CONSTANTINOPLE

Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

SCENE ON THE BOSPHORUS: VIEW SOUTHWARD FROM ORTAKEUI

The shores of the Bosphorus are lined with beautiful buildings, mosques, and palaces

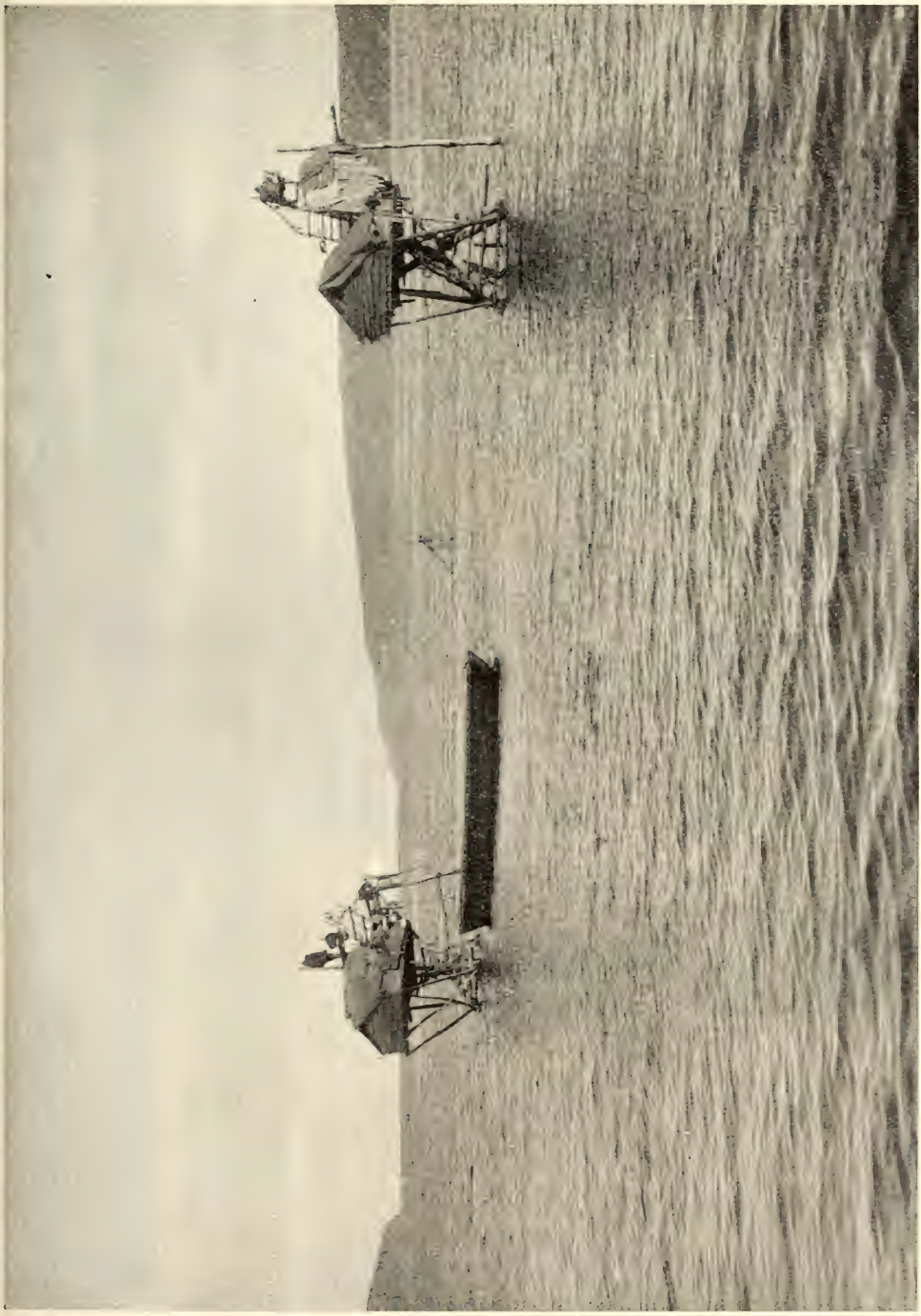


Photo from "Constantinople," by Edwin A. Grosvenor, Amherst College

THE END OF THE BOSPHORUS: THE ENTRANCE TO THE BLACK SEA

The huts serve as look-outs for fishermen. From these high perches they can discern an approaching school of fish. The Bosphorus has been fished for thousands of years with nets and every known contrivance, and yet the fish are as inexhaustible and diverse today as when the strait earned the title of "Fishy Bosphorus" centuries ago.

Hamdi Bey has agreed to open an art school for women some day in the near future. In fact, there is no subject that is being discussed with greater interest and vigor in the Turkish press today than that of the education of women. Now is the opportunity for foreign education in Turkey, when not only the Greeks, Armenians, and Bulgarians desire American education, but the Turks themselves look to America for help. They are crowding into our schools, and there is not room to receive them. American education in Turkey is a powerful ally to the Committee of Union and Progress.

SUNSHINE IN TURKEY*

By Howard S. Bliss

President Syrian Protestant College at Beirut

THOSE of you who have had the good fortune to visit Constantinople know that the gloom of a rainy day in that city is exceedingly gloomy, and you also know, if your sojourn has been somewhat prolonged, that the glory of a sunshiny day in Constantinople is exceedingly glorious. Such a day was yesterday—a day that stands out and to all appearances will stand out in the history of the Ottoman Empire as one of its great days; and in your behalf, I venture to say, as well as in behalf of our fellow-citizens throughout the country, we may well thank our representatives in Congress for sending across the water to the people of Turkey good wishes and congratulations upon the occurrences of yesterday.

As you read the papers last evening and this morning, you followed in imagination that crowd as it surged down from Galata over the bridge and up the slopes to the Mosque of Sophia. You saw the Sultan start from his palace and take that route which is a new one for His Majesty. Everywhere the appearance of the streets indicated that it was a festival day. The splendid Turkish soldiers, than whom you can find no finer set of men in all the world; the Turkish flags, the huzzas of the people, the crowds of women—now a new factor in the gatherings in Turkey; not only the houses, but even the mosques, crowded with spectators looking down upon this new, strange scene—you could see it all!

I took the pains today to look up the record of the meeting of the first Parliament, in 1877, and there appeared in the London *Times* a long letter from a Constantinople correspondent describing the opening of that first Parliament. Apparently all the details were given, but the account lacked those characteristics of popular enthusiasm which fill the accounts that appear in today"s papers; and this enthusiasm of the people is full of happy augury for the future.

The scene in that Parliament chamber yesterday, where the Sultan, after his speech had been read before the representatives, joined in the prayer of the judge—the priest-judge—who asked God's blessing upon that gathering, was a scene of great solemnity, followed by a scene of great enthusiasm, participated in by hundreds of thousands of men, women, and children.

The contemplation of all this takes us back five months, to those other scenes that accompanied the strange events in July. None of us had the remotest idea that the revolution was coming so soon. Although I was not present, I know something about the effect that was produced in Beirut, Syria, when it was announced that the constitution had been granted. Beirut is the largest seaport town of Syria. It is a city of one hun-

*An address to The National Geographic Society, December 18, 1908.

MOSQUE OF YENI-DJAMI ON THE BOSPHORUS: CONSTANTINOPLE

dred and twenty or one hundred and thirty thousand inhabitants.

LIPS UNLOOSED AFTER 30 YEARS OF CENSORSHIP

At first, when the news came, people could not believe it. They thought there was some mistake in the telegrams. They did not dare to show their enthusiastic approval of this constitution. For years they had learned to keep their lips closed. For years they had harbored their secret hopes in silence, and for one, two, and three days even, there seemed to be a suspense hovering over the city, between fear lest this should not be true and a great exultant and growing hope that it might be true. At last they realized that it was true, and then the city gave itself over to three days of festivity, of enjoyment, and of congratulation, the like of which had never been seen before in Syria. They learned from the dispatches that the Young Turkey Party had taken the opportunity of informing His Majesty the Sultan that now was the time for the promulgation of the constitution, and I need not rehearse the circumstances that led up to that demand; but you know that the Sultan accepted the statement of the Young Turkey Party, namely, that it was indeed time to promulgate the constitution.

In public, before an assemblage of a hundred thousand people, the Sultan announced his adherence, swearing before Almighty God that he would be true to the constitution.

Not only was that done, but, what was most important, the Sheik ul Islam made

the declaration before that same assemblage that the Sultan had taken this position, in that way giving the pledge of the Koran to the legitimacy of that step.

Not only that, but the Sultan gathered together the ambassadors and ministers and the representatives of all the foreign powers and declared that he had given his assent to the promulgation of a constitution.

Not only that, the soldiers were assembled, and they in the presence of the populace of the city took their oath of allegiance to the new constitution.

So every step was taken to assure, so far as the future could be assured, the conclusive adherence of the government to this new policy.

All this news came to Beirut during those two or three days. There came also the statement that the people were to prepare for the election of the electors, who then should elect the deputies for the Parliament that met yesterday. And then the city broke loose. It could no longer restrain its enthusiasm. Even then there were some who would not believe that it was true.

I have a very shrewd and intelligent Syrian friend, with a touch of pessimism in his make-up. He said to my brother, who met him upon the street one day in August, "If I had been told by my most trustworthy friend that these things were happening in Beirut, I should not have believed it"; and he continued: "I myself went down to the great meeting-place, before the government offices in Beirut; I myself went down to the Bourge and, after all these years of waiting, I saw with my own eyes that these wonderful things were taking place, and still I do not believe it is true." Men were saying things that they had not said during their whole lifetime. They were saying "fraternity," they were saying "equality," and they were saying "liberty." If they had said those things the week before they would have been in danger. Boys were hawking telegrams and newspapers about the city containing all the wonderful news uncensored.

I have a friend who is editor of a newspaper in Beirut. A few months ago there inadvertently appeared in one of the advertisements of that paper an Arabic word forbidden by the censor. Immediately he was sent for and his paper was suspended for three months because of that one word.

Now everywhere men, women, and children were crying out these forbidden words. What had not been allowed for thirty years was in evidence all over Beirut. Men gathered in large groups. Audiences and orators sprung up like mushrooms. The torrent of eloquence that poured forth there was such as would put Niagara to shame.

CHRISTIANS AND MOHAMMEDANS PUBLICLY EMBRACE

There were people mingling together there who during the past years had been bitterly antagonistic to each other, but who now were showing their friendship in public; Greek Orthodox and Mohammedan priests were embracing each other; branches were cut down from the trees; rugs were brought out from the houses; the streets were lined with people offering their hospitality to their new-found brothers; everywhere, even among the criminal classes, there were these evidences of good fellowship.

For the past years we have been troubled in Beirut by a gang of Moslem ruffians who are worse than ruffians and who terrorized a certain part of the city. Opposed to them was an equally dangerous gang of Christian ruffians. (And permit me to remark parenthetically that when I use the word "Christian" I use it in the purely political sense. In the Turkish Empire any one who is not a Jew, Moslem, or Druse is a Christian. A man was once asked by a traveler as to whether there were any Moslems in the town from which he came; to which he replied, "Moslems! not a bit of it! We are all Christians. Let any Moslem show his face in our village, and we will smash his head for him! We are Christians!")

Well, there were Moslems and Christians in these two gangs of ruffians, keeping, as I said, all the city terrorized. But

now, behold the dawn of liberty! Now, behold the dawn of fraternity! Whereupon the gang of Moslems, headed by a band, went up to the headquarters of the gang of rowdy Christians, escorted them down to the Bourge, and feasted them there and waited upon them as their servants. I am not sure whether the meal was enjoyed by the guests, the Christian rowdies, because I presume they all thought there might be some poison mixed in the food; but at any rate the meal passed off successfully and no one died. A few days later there was another procession, and now the Christian rowdies—no longer rowdies, but brothers—went up to the Moslem rowdies and escorted them down to the same place and gave them a return meal; and there again there was no poison and there were no concealed daggers!

In all parts of the city there were different assemblies of the people addressed first by a Christian orator, and then by a Moslem, and then by a Jewish rabbi. Some of the instructors from the college spoke, and I only wish that one of these Syrian instructors, who have spent from four to ten years in our college, might be here tonight. I know they would be able to thrill you, speaking, too, in English that could not be criticised. How they would pour forth their souls under the power and the fervor of that new liberty that is filling their hearts. It would wake us up. Sometimes I feel that we are inclined to become somewhat indifferent in this country; that sometimes our patriotism needs to be touched with a new fire and to be deepened and chastened with a new consecration. I am sure, as I say, that if one of these Syrian orators, speaking to you in English, were here he would be able to touch us to a new realization of the meaning of our liberties.

To them the Turkish flag has become a new flag. Did it ever occur to you that the Turkish flag is a beautiful flag? When you have looked upon it with the star and crescent upon the red field you have been accustomed to think of that as a setting star; but I assure you, my friends, in the opinion of these Syrians and these Turks and all the different elements of the Turkish Empire, the star in that flag is not a setting star, but it is the star of the morning, and it is a waxing and not a waning crescent.

THE PATHETIC STORY OF FUAD PASHA

Still other things happened there in Beirut. One of the things that came with the promulgation of the constitution was the granting of amnesty to political prisoners. It has been said that forty-two thousand men were affected by this action—some put the number as high as sixty thousand—who during the last thirty years have been asked to leave Constantinople for the benefit of the state. They have been sent to all parts of Europe. The very men that were regarded by the powers in authority as representing what they supposed to be the most poisonous influence have proved to be the very best means of promulgating the doctrines which had seemed so dangerous.

Doubtless some of you have been to Damascus. You may remember, if your visit has been during the past six years, that as you went through the city to the hotel, upon the left you noticed a large building. In front of the building were stationed guards. That made you suspicious. Not only that, but you saw all the windows barred up with great wooden shutters. That necessarily led you to ask, "Who lives there?" and "Why is the house so guarded?" and the answer was that that was the residence of Fuad Pasha. "And who is Fuad Pasha?" and you were told that six years ago he was a man of great influence in Constantinople—a man whose military record was notable. Six years ago this man fell into disfavor, and he was sent to Damascus; but there, in that barricaded house, Fuad Pasha spoke more eloquently and more effectively than he possibly could have spoken if he had remained in Constantinople.

Now, when the declaration of amnesty

came, word was given to Fuad Pasha that he was at liberty to return to Constantinople. But the grim old soldier said, "No, not until my sword that was taken from me in Constantinople is returned to me; no, not until those medals removed from me have once more been placed upon my breast."

The old man waited, and then in a short time the sword and the medals came, and presently he began the triumphant return. He was carried by train to Beirut. The enthusiastic populace seized him as he came out from the train and insisted on taking the horses out of the carriage and dragging it to the hotel. Indeed, in the exuberance of their Oriental enthusiasm, they were about to carry the carriage bodily to the hotel. However, with some regard for his own life, he stopped this form of demonstration and finally persuaded his admirers to let him go in the ordinary way. After this there followed a series of popular assemblages in honor of Fuad Pasha, and many speeches were made. Then there came the triumphant journey of the old hero to Constantinople. They say that when the French steamer that was bringing him finally reached the harbor the great populace was there waiting to meet him, and that it was a great sight to see the old general as he stood upon the captain's bridge, his white hair whiter than it was six years before, and he was not ashamed of the tears that coursed down his face and which showed his devotion to the people as he came back to his beloved city to be received with that kind of a welcome.

TURKS PAY HONOR TO MASSACRED ARMENIANS

So over the Empire—not simply in Beirut, not simply in Constantinople, but in the smaller places as well—these scenes were repeated until the whole Empire was rejoicing with one heart. Away down in Medina, on the railway that the Sultan is projecting as far as Mecca, the event was celebrated. The opening of the railway and the granting of the constitution were extolled at the same time.

Everywhere Moslems meeting men of other faiths used for the first time in five hundred or six hundred years the salutation that is usually confined to their fellow-believers, "Peace be upon you!" and then the answer, "And upon you may peace also rest!"

But what may be regarded as the culminating point of this spirit of fraternity was witnessed in Constantinople, when Armenians, accompanied by many Turks, visited the graves of those who had been massacred and there offered prayers of thanksgiving for the coming of this day, while the Turks expressed their sorrow for the events that had destroyed so many of the lives of the brave Armenians; and the next day Armenians and Moslems went into the churches in Constantinople, and there addresses were given by Turkish Moslems and Armenians expressing thanksgiving to God for the coming of this day.

The work that was done in Salonika by the Young Turkey Party in bringing about this constitution made that a place where the rejoicing was particularly enthusiastic.

They tell us also that when the prisoners were released under the new amnesty the danger of such a move disappeared in the presence of the solemnity with which the act was performed. Every prisoner was brought into the presence of one of his priests, and he was obliged to put his hand upon the Bible or upon the Koran, and was then asked these questions: "Do you promise upon being released to abjure all crime? Do you promise to refuse to do that which will injure in any way the safety of society or the state?" And only then, when he had promised, not simply with his hands placed upon the Koran, but with his uplifted hand in the presence of Almighty God, only then was he allowed to go free. They also made this declaration: "The people have set you free. See to it, that you serve and respect the liberties of the people or you will be in short order hanged." And the answer was, "We shall not be hanged, for we do propose to serve the interests of the people."

And this is the wonderful thing about it: You say this is hysteria; you say this is Oriental exuberance, but, during these weeks, or I may say during these five months, there has been scarcely any bloodshed. There has been a feeling of solemnity; there has been a religious feeling appropriate to the man who has been thirsting for hours and for days and for years for liberty and at last is giving thanks to God for the pure, fresh gift, all the more gratifying because it has come to him so unexpectedly.

MOSQUE OF OMAR OPENED TO CHRISTIANS

In Jerusalem, in that wonderful sacred inclosure of the Mosque of Omar, for three days there were gathered Jews, Christians, and Moslems. You know how difficult it has been ordinarily to get into that inclosure. You were obliged to obtain permission from the local authorities and your consul. But for three days, as an evidence of this feeling of fraternity, men were allowed to go into this mosque. They said, "When I see a man going to a church I know he is a Christian; when I see a man going to a synagogue, then I know he is a Jew; when I see him go into a mosque, I know he is a Moslem; but outside of this and at all other times men are Ottomans and brother citizens of the state."

The Ottoman Turks number only about five million in a population of twenty-five million; or, if we include the population of the states that are dependent to some extent or have been dependent upon Turkey, the population is about forty-one or forty-two million; but this name Ottoman has now affixed itself upon this régime; it is one of the conditions of the constitution that the citizens are to be called Ottoman subjects, and today all these men are not Syrians, are not Macedonians, are not Armenians—they are Ottomans.

THE REVOLUTION WAS ACCOMPLISHED WITH ONLY A FEW CASES OF MOB VIOLENCE

All this has gone on with wonderful moderation. Those antagonisms that have grown deeper and deeper for all these years, suddenly—for the time being at least—seem to have disappeared, and the moderation has showed itself, as, I have already indicated, not simply in the burying of those antagonisms, but in the freedom from all violence. There were some exceptions. But, as we think a moment, the wonder is that the exceptions were so few. One of the exceptions is the murder of Fehim Pasha, who accomplished the exile of Fuad Pasha, together with the exile of hundreds of others—the man who through the representations of the German and British ambassadors was finally exiled to Brussa. Word came that the new constitution had been proclaimed, and at once this man in exile, who, though in disgrace, was receiving many favors, became fearful of his safety and sought to escape. On his way to shelter he was recognized in the street. The people could not restrain themselves. There was the man who had been responsible for all these strange disappearances and the exile of so many men, the persecution of so large a part of the population. The people seized upon him and literally tore him to pieces. But this was not at the command of the Young Turkey Party. That committee of young Turks in Salonika restrained as soon as possible the outburst. That was one of only a half dozen cases. Probably there may have been some others that we have not heard about.

HOW LONG WILL THIS GOOD WILL CONTINUE

I submit that all this is wonderful. I submit that it would have been wonderful if it had lasted but for a single day. I submit that it is wonderful because it lasted a week, because it lasted a month, because it has lasted for five months. In fact, if this revolution should go back tomorrow to a period of bloodshed and persecution it would still be wonderful that so much was accomplished in a land where antagonisms were so strong and where passions so easily slipped out of leash.

A letter came from a Turk to an American soon after this constitution was promulgated, and this is what the letter

said: "We know that we have great disappointments before us. We know that we have hardships before us, perhaps failures; but nothing can ever take away from us the joy of these first days."

You are asking the question now as to whether this is going to last. Will it last? How long will it last? Some of you also have been looking up the records of that first parliament thirty-two years ago. You admit that there is a difference in the accounts, but you have said that the imagination of the reporter was not as exuberant then as now. You have said the telegraphic facilities were not so great, and therefore many details were left out. Probably then there was this great acclaim; probably then there was this great enthusiasm. And how long did it last?

But I believe that you will see that whether failure is before this present enterprise or not, the conditions under which this constitution was promulgated are very different from those under which the constitution of 1876 was established for so short a time. The very evidence that is being brought forward now—and I might have repeated indefinitely stories illustrating that universal joy—that evidence is clear enough that, whether the people know much about it or not; whether they understand perfectly all the difficulties that arise before them, they are back of this movement for liberty; they are tired of living in the Middle Ages; they wish to live in the twentieth century; and whether this enterprise is successful or not, some enterprise will succeed that will enable these men, women, and children to live in the twentieth century.

It is the Young Turkey Party, not young in years, for many of them are white-haired men; but they are indomitable, young in their hope and in their aspiration and in their determination and in their idealism; and it is the spirit of idealism that is back of this movement.

The dangers are innumerable; every one can point them out. Enemies abound. The variety of race, the variety of religion, which so easily result in mutual antagonisms; the action of the European powers—all those are dangers which menace. What will overcome these dangers?

I cannot speak upon European politics, except to say this: As for Europe, as for the dangers that threaten this new movement from the action of the European powers, there is only one hope, and that is the hope that the Christian nations of Europe in their dealing with the Moslem people will show a sense of fairness, will show a sense of generosity, will feel the thrill of chivalry, so that a new crusade may conquer, not upon the battle-field, but in the field of twentieth-century diplomacy. And, please God, great old England, where chivalry is not dead, will have a large voice in that matter; and, please God, the United States of America, where chivalry is not dead, will have a voice in that matter.

But what is to be said for the other dangers that menace—antagonisms that have been developing all these years; where men of different races and religions have often been ready to fight each other, with the result that their attention has been concentrated upon their local, petty jealousies? What is to be said of these dangers and how can they be overcome?

THE TURKS ARE A SPLENDID RACE

Let me tell you something of the racial diversity. This country is occupied by twenty-five million people. There are Turks, as I have said, five million strong, followers of that first Ottoman who broke out of the great central Asia and established an abode in Europe—a splendid race itself, strong and valiant. People talk sneeringly about the Turk. The Turk is not a man to be sneered at, and the fact that for six hundred years that dynasty has held control of the Turkish Empire is a fact that shows that the Turkish rulers are men of ability. The present Sultan is not a man to be sneered at. If you were to see him as many of you probably have seen him, you can see that the caricatures in the papers are caricatures. You can see

by his very presence that this man, now in his sixty-sixth year, is a man of force, is a man of industry, is a man who has a definite policy; and during these thirty-three years since those first parliaments he has been busy establishing schools, building mosques, and erecting hospitals; busy establishing sanitary measures for the improvement of the health of his people; busy constructing railways; busy these past years in establishing that great railway from Damascus to Mecca.

Then, of course, we know the Armenians, the Kurds, the Circassians, the Albanians, the Syrians, and the Macedonians, Bulgarians, Servians, Greeks, and Moslems that occupy Macedonia—all of them races of ability; and lastly there are the Arabs. History shows us how capable they are.

As for the antagonism of races and religions, only the forces of patriotism, of enlightenment, and the forces of religion can hope to overcome these antagonisms.

During these past thirty years, as I have indicated, many schools have been established by the Moslems and the Christian sects. At the present time I suppose there are nearly forty thousand schools in the Turkish Empire, and very probably a million and a half boys and girls are attending those schools. The curriculum is not very advanced; and yet I was in the southern part of Syria some months ago, in a little village far away from the railway, hundreds of miles from Damascus, and in that little village there was the local school and there were the scholars. They are all over the Empire. Although the system is not advanced, these schools have been advancing. A school is a school, and the boy who goes to school has pushed against the door that opens into the twentieth century.

THE AMERICAN COLLEGES IN TURKEY

And now, I venture to speak of the college with which I happen to be connected as a type of the higher schools and institutions that are scattered in various places in the Turkish Empire. I wish I might speak at length of other institutions. I wish I might speak of the Roman Catholic institutions and of the work that is being done by them, but time does not permit. I speak of the Syrian Protestant College because it is a type of the American colleges in the Turkish Empire. These colleges are the best influences, I believe, in the important work of the enlightenment of the people. There is such a college at Aintab, one at Harput, one at Smyrna, one at Marsovan, another at Tarsus, and Robert College at Constantinople. There is also the Woman's College at Constantinople. These colleges were established by Americans in order that the people of Turkey might have the blessings and advantages that we have received.

And now I am going to take you a moment right to Beirut—that city which to me is the most beautiful city in the world—and into that chapel where all the students are gathered together. On the platform are assembled seventy of our professors and instructors. There are many races represented by the professors, although a plurality of the force is American. Here in front of us are eight or nine hundred students. On the right is the School of Medicine. Here in the center are the students who are studying for the degree of B. A; on the left are to be seen the students of the School of Commerce and the School of Pharmacy; then toward the back of the building are those pupils who are in the preparatory department. You would be rather disappointed when you first saw these students. You would expect to see something more picturesque, for unfortunately, instead of retaining their native costumes, those men will persist in adopting our unpicturesque clothing; but when you come to ask where these men come from and who they are, you realize immediately why it is that these institutions and schools are such important factors in overcoming all these antagonisms of which I have spoken. You might think they were all Protestants, whereas the Protestants constitute but a mere handful of them. There are over a hundred

Moslems, nearly a hundred Jews, a hundred are Greeks, fifteen or twenty come from Persia, several come from India, a group comes from Bulgaria, and one comes from the Desert of Gobi. This is a geographical society, so you know exactly where the Desert of Gobi is. I found that the students in the college last year represented 214 cities, towns, and villages. Now when the forces that are at work in those villages are touched by the forces that are represented by men who have but a year's study, or four years', or perhaps ten years' study in the college, you begin to appreciate the power that lies in such an institution.

Then the religious problem is still more interesting. You see this is a Christian college. It is a Christian college in the same sense that our own colleges in this country are Christian institutions. We are there to share with the youth of all races and all religions the Christian ideal. We are not there to proselytize or to cram religion down their throats, but we are there to share the best influences that have come to us, the best things in the laboratory, the best things in the classroom, the best things in the religious forces that we have ourselves enjoyed. Those young Moslems are proud men, as they stand for their religion as a great religion, and you must not sneer at this religion. The way in which to overcome Islam is to fulfill the great principle of the founder of Christianity when he said, "I came not to destroy, but to fulfill."

THE GREAT FRIEND OF THE PROPHET

You know something of the early history of Islam; you know something of its early leaders: Of Omar, who was the great friend of the Prophet and who soon became his successor. You know how he stood out for the principle of abstinence as laid down in the Koran. When it was told him that Khalid, the governor of Damascus, a man who was called the Sword of God, because he had been so successful a general, had found that certain leading Moslems had taken intoxicating liquor, but in view of the fact that they were so influential, he felt that they ought to be pardoned—when, I say, Omar, the calif, heard of that, his anger knew no bounds. He sent this message to the governor of Damascus: "Khalid," he said, "make an assembly of the people, as great as you can. Call these men before thee and ask them this question: 'Did you or did you not take intoxicating liquor?' If they say they did, then before the people give them one hundred and twenty lashes, sixty being the ordinary punishment. But if they state they did not, when you know that they did, behead them, every one."

This Omar was the man who, when he assumed the power as calif, stood before the people and laid this down as his inaugural message: "By God, he that is weakest among you shall be in my sight the strongest until I have vindicated for him his rights; but he that is strongest will I treat as the weakest until he complies with the law."

Now you can imagine how those young Moslems are listening intently as the Bible is read daily from the pulpit and prayers are offered and a word of exposition or exhortation is spoken. As I said, we do not cram religion down their throats. They are not there in the college in order to become Christians or to adopt any other particular form of religion, but we are there to share our Christian ideals with them. We do not ask them to do anything contrary to their religion. We frankly say that we feel that a system of education to be a complete system of education must include the education of the spirit and of the soul. We tell them that the very best thing we have to share with them is the Christian ideal, and if they cannot attend the chapel services conscientiously they must seek some other institution.

In the chapel we do not compel Moslems and Jews and Druses to bow their heads. We ask them to do that which they would ask us to do if the position were reversed and if we were ourselves in a Moslem mosque or school, namely, to show reverence and to maintain quiet; and they do. We tell them that a man

cannot be an educated man unless he knows a great deal about the history and spirit of Christianity, just as we cannot consider ourselves in any way as educated men unless we know about the history of Islam, of Confucianism, and of Buddhism; and they, too, must become men who are acquainted with the history and with the spirit and with the teachings of Christianity; and I am glad to say that in the history of the college, I believe I may say with perfect accuracy, there has never been a case where it has been seriously charged that we took an unfair advantage of these Moslems or Druses or Jews.

I remember an instance where the Moslem students were observing a period of fasting and prayer peculiar to their faith and were kneeling in the dormitory in an attitude of prayer. I heard one day that some of the so-called Christian students were making sport of the Moslems as they were thus kneeling in the dormitory. As this was entirely contrary to the spirit of the college, when they were assembled the next day I took occasion to speak of it and to apologize to the Moslems for the action of the so-called Christians. It seemed a simple thing to do, but will you believe it when I tell you that my statement made a sensation among the students. "Why," the Christian students said, "what does this mean? Has the president become a Moslem, that he is actually apologizing to the Moslems?" And I suppose it was the first time in the history of those Moslems that they had heard a Christian apologize to them as Moslems for any indignity that may have been shown them.

When Moslems go forth from the college they at least go forth with the knowledge of the Christian ideal and with a large appreciation of the idealism that has made Christendom what it is. And so with the Jews and so with the Druses. I simply speak of that to illustrate the method of the college; to show how it is that in these different religions we are emphasizing the spirit of religion rather than that of religions, with a frank, clear, and open statement of the principles of the Christian religion; and that is the reason why that force of nearly nine hundred students becomes little by little so unified, although the fraction of the Protestant Christian element is as small as it is.

PRINCE AND PEASANT EQUAL ON THE FOOTBALL FIELD

So also in political questions. It is understood by every student that enters the college that as students and professors we believe in revolution without the capital R; and thus little by little they understand that it is possible for men, differing as they do racially and politically, to have a common ideal and patriotism. I remember that many students were surprised when Mr and Mrs Bryan visited us that we, who represented for the most part a party opposed to Mr Bryan, should welcome him so heartily, and I may say that Mr Bryan delivered a magnificent address to the students, that will long remain in their memories.

The same spirit pervades even the athletics. You will find the son of a prince plying foot-ball under the captaincy of a peasant or the son of a cook. We believe in foot-ball there and we have seventeen or eighteen different foot-ball teams in the college. This game develops the ability to receive a hard blow without showing the white feather or drawing a dagger. This means that when the men get out of the college they will stand upon their feet as men.

The same forces are at work when you go into the dining-room. You will find there students representing all races and all religions and all sects earning their tuition and earning their board by waiting upon the table. That is just as much a lesson for the people of America as it is for Syria. Thus the principle of service receives its daily illustration.

What becomes of our graduates? It is easy enough to gather men together with the cry of education and the twentieth century, but the question you are asking may well be this: How do you hold them and how do you send them forth? Eighteen hundred of them have gone

forth in the history of this college bearing diplomas or certificates of various kinds, that of Doctor and Surgeon, and that of Master of Pharmacy, that of Bachelor of Science and Bachelor of Arts. They become the doctors of Asia Minor; they become the doctors of the Sudan as far as the Equator; they become the doctors of Egypt; they become lawyers and teachers and preachers. Those eighteen hundred are but a small proportion of the students who attend the college, for many of them leave before the end of the course or a degree has been received.

I admit that I am a prejudiced speaker, but I assure you that I have tried to be accurate in my statements, and I ask you to judge for yourselves whether those eighteen hundred men, going out into the world after a fixed course of study, do not go forth as a mighty force to break down the antagonisms of races and religions? go forth as forces of a patriotism, of a solidarity, of a unity that speak well for the future of the Turkish Empire?

I do not conceal the fact that the difficulties that lie before us are very great. But do not forget that eight or nine colleges are doing in Turkey the same kind of work as ours. You can imagine that wherever a graduate is found there is a new light illuminating the region around about him; that there is emanating from that doctor's office, or that lawyer's office, or that preacher's house a force that is making for civilization—those centripetal forces that overcome the forces of ignorance.

TURKEY OUR ONLY FRIEND IN 1862

Forty-six years ago my venerable father, the founder of this college and its first president, now in his eighty-sixth year, visited Washington and saw President Lincoln. He had been directed by his fellow-missionaries in Syria to visit Secretary Seward. His mission was this: There had been some petty misunderstanding in connection with some matter affecting missions, and my father was charged by his fellow-missionaries to see whether it was not possible for the Washington government to use such representations with the Turkish government as to put an end to these petty annoyances. Mr Seward said to my father, "Dr. Bliss, do you know that of all the foreign powers, the government of Turkey is the only one that has expressed any sort of sympathy with the United States in the great struggle now going on?" My father was silent and bowed himself out. He understood.

And I wonder, ladies and gentlemen, whether there are not still more potent reasons why we, citizens of a republic that has not yet completed the journey toward the goal of liberty, but citizens of a republic that has been able to measure many a mile upon the arduous pathway, passing over a road that has not been always easy, should not content ourselves with simply sending a message from our Congress to Turkey at this critical hour in her history. Shall we not send to that empire a message in the form of support of these schools and institutions that quietly and silently but effectively are strengthening those forces that are making for civilization?

I understand that many of you here in Washington have been interested in a noble enterprise established upon the slopes of Lebanon, the first hospital in the Turkish Empire for consumptives. It is a good work. But I would plead also for those other enterprises, which are making not simply for physical health, not simply for intellectual integrity, but are making for the moral and spiritual regeneration of the empire.

I thank you most sincerely and heartily for your attention. I only hope you will yourselves visit Turkey and see for yourselves the growth of liberty, fraternity, and equality in that great empire.

HONORS TO THE AMERICAN NAVY

NEARLY every state, territory, and insular possession of the United States and many foreign countries were officially represented at the annual dinner of the National Geographic Society, which took place on the evening of December the fifteenth last.

The banquet hall of the New Willard Hotel was beautifully decorated with flowers and palms, and covers were laid for four hundred. The divine blessing was asked by Right Rev. Bishop O'Connell, Rector of the Catholic University of America.

INTRODUCTION BY THE TOASTMASTER, THE PRESIDENT OF THE NATIONAL GEOGRAPHIC SOCIETY, DR WILLIS L. MOORE

The principal theme of this annual dinner of the National Geographic Society will be the achievements of the Navy of the United States. In many ways the Navy has added to the sum of our geographic knowledge, and its magnificent feat of assembling the greatest armada ever brought under the immediate direction of a single commander, and then, at this date nearly circumnavigating the globe without mishap, and with the fleet every moment ready for action, is worthy of celebration, not only by this society and by this nation, but by all the nations of the earth, for its guns are shotted, not with the arbitrary power of the tyrant, but with the humane sympathies of a mighty nation. And so the National Geographic Society honors itself in paying homage to the Navy.

We will now have a word of greeting from one who is about to retire from the responsibilities of a great office; but we would say in passing that neither by his own volition nor by the act of others can he ever retire from the affection of those who during his long years of public service have come into personal association with him; he cannot retire from the admiration of those who have watched his course as a man of clean purpose and of noble ideals in statesmanship; he cannot retire even from the respect of his political enemies—the Vice-President, the Hon. Charles W. Fairbanks.

A WORD OF GREETING—BY THE VICE-PRESIDENT OF THE UNITED STATES, HON. CHARLES W. FAIRBANKS

It is a very agreeable duty, indeed, which has been assigned to me, and I only regret that I do not possess that gift of utterance which will enable me to conform literally to the sentiment which appears upon the program. "A word of greeting" seems but an inadequate return for your manifestation of cordiality and of kindness. The toastmaster has evidently not appreciated the fact that a word of greeting is a somewhat ambiguous term. In the Senate of the United States, when a Senator arises and is recognized by the Chair and states that he wants to say a word, it is invariably a signal for an exodus of the older Senators to the cloak-room.

I have been somewhat diverted from the contemplation of this theme at the table tonight by the Attorney-General of the United States. He has developed qualities I did not suspect. He had no sooner taken his seat than his eyes began to sweep over this magnificent gathering and he wanted me to point out the handsomest ladies in the audience. I asked the number of ladies here of the toastmaster, and he said there were 120. I then said to the Attorney-General, "There are 120 handsomest ladies in the audience." This is another evidence of the good taste of American statesmen.

I want to congratulate you, sir, and your associate members of the National Geographic Society, upon what you are so admirably accomplishing. The scope of your investigation is as wide as the continent—in fact, as wide as the world itself. You are circumscribed by no limits in science or in geography; you comprehend it all in your generous purpose. It is a splendid thing that here at the National Capital, where are centered so many splendid influences, this great organization should have a habitation and a home.

The theme of the evening, I understand, is the American Navy. It is a great theme, indeed, and one worthy of the contemplation of this great organization.

The United States has had much to do with the geography of the world in the past few years. It has changed the map of the republic, and it has changed the map of the world. And the change was largely accomplished through the genius and courage of the American Navy. There is one thing about the American Navy I like above all others, and that is that it has never brought other than glory and honor to the flag of the great republic. It is not a navy aggressive against right. It is a navy that has always been summoned, whenever summoned, to vindicate right and justice, the honor and good name of the great republic.

I sat with President McKinley soon after the breaking out of the Spanish War. It was at the time the *Oregon* was making her tremendous sweep from the Pacific around South America into the Atlantic Ocean to aid our navy upon our eastern coast. It was rumored that the Spanish fleet was lying in wait and with multiplied numbers was expected to overcome the *Oregon,* seize possession of her, and turn her guns against the United States herself. The President wore upon his face evidence of the great stress and strain through which he was passing. He knew better than the American people the gravity of the situation. He said to the Secretary of the Navy, who was discussing the trip of the *Oregon* with him:

"Mr. Secretary, if the Spanish fleet overpowers Captain Clark, will he go down with the *Oregon?*"

"Yes, Mr. President; if Captain Clark finds himself outnumbered by the enemy he will carry his ship to the bottom of the sea rather than surrender."

And in that he voiced the sentiment of every man who wore the naval uniform or who wears it today. We take pride in our war vessels, majestic, powerful, and invincible as they are. But the thing that most stimulates our pride is the character of the men who man our vessels of war. I met an English lady who had recently returned from Australia, and who honored our city with a visit a few days ago. She said to me, "What is the most magnificent spectacle you ever saw?" I answered her, and then turned the inquiry to her and asked, "What is the most magnificent spectacle you ever rested your eyes upon?" And said she, "The most sublime thing I ever saw or ever expect to see was the great American squadron as it entered and anchored in Sydney Bay. Thousands and thousands of Australians had gathered there, and with loud cheers welcomed the great fleet, which was the visible evidence of the majesty and power of the Republic of the United States."

We indulge the hope that our Navy will always be regarded among the peoples of the earth as a harbinger of peace. We also entertain the confident hope that the cause of international arbitration may increase more rapidly than the navies of the world may develop, and that differences between nations may be honorably adjusted in arbitral tribunals. While we delight to honor the Navy, we also delight to honor those who seek to advance the cause of peace without a resort to the sword.

I want to again extend to you a greeting here. It is a delightful privilege we enjoy to gather here and meet and mingle as guests of this great Geographic Society. I thank you, Mr Toastmaster, ladies and gentlemen, for your courtesy and your kindness.

THE TOASTMASTER

The navies of the world have protected and made free the highways of marine commerce. They have brought together the East and the West; they have distributed the civilizations of the more enlightened nations, and have impressed them upon less rigorous peoples, to the great benefit of the latter. Our own Navy may be properly celebrated for the things that it has done in peace as well as those that it has accomplished in war, and the Hon. Truman H. Newberry will speak to the toast, "The Navy in Peace."

THE NAVY IN PEACE—BY HON. TRUMAN H. NEWBERRY, SECRETARY OF THE NAVY

The Navy makes its immediate appeal to public consciousness in the rôle of a mighty instrument of warfare, and as the public mind lends itself most readily to spectacular impressions, hence it is that the world pronounces the national defense and the maintenance of national prestige the sole object of a navy's existence. So powerful is the influence of martial achievement, so touched is human nature with the pride of prowess that it is difficult for the average person to believe that the Navy has a peaceful mission, and has, indeed, attained great achievements in times of peace.

This occasion happily affords an opportunity to trace briefly the forces of our naval power which have operated within a civilizing and educating sphere of activity. The energy expended in this direction during the last threescore years has brought new lands and seas within the confines of the known world, and insured their accessibility. Western civilization has been disseminated, and a new fund of geographic and commercial knowledge has been contributed to mankind. Toward every point of the compass, and against all the obstacles of nature, this arm of the national power has extended the boundaries of science, opened new channels of trade, brought the world into contact with new people, and assembled fresh and important biological and ethnological learning. This, and more, has been accomplished by the great educating power of the Navy, and the Government and the people have recognized this as part of its proper avocation.

The expeditions of exploration and research under the authority of the Navy Department cover a period of more than half a century. The first of importance was in 1835, when an expedition was sent into the North Pacific Ocean to explore and survey. Charts of many harbors and inland groups were made, among which was the first American chart of Bering Sea. In the same year an authorized expedition opened to commerce the valley of the La Plata, bringing into commercial contact with the world some of the richest provinces of Brazil by hitherto unknown navigable waterways.

Another expedition, and one which at that time was of pretentious proportions, was undertaken to the South Sea Islands, partly for the protection of our whaling interests, and also for the discovery of a continent which was supposed to lie in the region of the South Pole. And a striking and remarkable picture of naval progress may be had by contrasting the character of this expedition with the notable cruise now in progress. Lieutenant Wilkes' squadron of six wooden sailing ships, the largest being of 700 tons displacement, sailed out from Norfolk in 1838 and passed through the Straits of Magellan on its peaceful mission of exploration and scientific investigation—to mark out in the vast and unknown oceans the pathways of commerce, over which was destined to sail seventy years later, from the same port, the magnificent fleet of today, bearing the peaceful greetings of this nation to the maritime countries of both hemispheres.

The operations of the Wilkes expedition extended over a region of ten million square miles, within which more than five hundred islands were charted, more than two thousand drawings of costumes, scenery and natural history were brought back, together with thousands of botanical and geological specimens. Wilkes also realized the dream of his life in the discovery of a large body of land lying within the Antarctic Circle, which he named the Antarctic Continent.

In 1831 a United States naval officer, under orders from the Navy Department, explored from the headwaters to the south of the Amazon, and opened that valley for the first time to the trade and commerce of the world.

To the Navy is due the credit of successfully opening negotiations with and bringing into the family of nations the densely populated and wealthy islands of

Japan. This was accomplished after the overtures of Portugal, Holland, England, Spain, and Russia had failed, by the untiring industry and consummate tact of Commodore Matthew Perry. The history of Perry's negotiations and final success in this delicate task is an enduring example of prudence and persistance.

The Frigid Zone and the region of the North Pole, the objective point of recent expeditions, has been from time to time penetrated by expeditions under the authority of the Navy Department, and within the last half century new lands have been added to the map of the world, the whaling industry has received a powerful impetus, and new species of animals and valuable minerals have been discovered.

The *Jeanette* expedition set out from San Francisco in 1879, under the command of Lieutenant Commander De Long, to whose enthusiasm for Polar research the inception of the expedition was due. The *Jeanette* was crushed in the ice north of Siberia, and the party, after traversing the ice on sledges, set out for the land in boats, of which one was lost, a second reached the Lena River with but two survivors, and a third, containing Chief Engineer Melville and Lieutenant Danenhower, arrived at the Lena in October, 1881, and after months of search found the bodies of De Long and his companions, which were brought to New York and interred with military honors.

General Greely, in 1881, was appointed to establish thirteen circumpolar stations in the Arctic regions, and a division of his party reached the farthest point north up to that time. The survivors of Greely's party were rescued by the naval relief expedition under Rear Admiral Schley in 1884.

But of all the expeditions into the Arctic region none surpass in brilliancy those of a civil engineer in the Navy, Robert E. Peary. In 1886 and 1887 he made a reconnaissance of the Greenland coast. In 1893 and 1895 he made another voyage to the Arctic Highlands. In 1906 he reached 87 degrees 6 minutes, the nearest approach to the North Pole in the American Arctic cruise, the results of which may prove of tremendous interest and value to the world. Endowed with the experience of similar service and a thoroughly modern equipment, his present effort should go far toward the reclamation of the great ice-locked North.

In 1882 another cruise under the authority of the Department was made in Bering Sea and the north coast of Alaska, and a valuable report was made concerning the currents and the movements of the ice in those waters. And in 1899, when the results of the first expedition through the Amazon had long been reflected in the profitable trade in rubber, cocoa, and nuts, the U. S. S. *Wilmington* ascended the same great river for 2,300 miles, gathering new geological and commercial information, and in general examining into the feasibility of penetrating the South American Continent.

Besides the great world-wide benefits that have accrued from these expeditions, out of a great number of which only a few of the important ones have been mentioned, they have proven of inestimable value in the more technical matters of the laws of storms, the climatology of the oceans, the ocean currents, fog conditions, and the construction and publication of charts. Special study and research along these lines is being continuously and with increasing efficiency carried on by the Hydrographic Office and the Naval Observatory.

The fruits of these expeditions of research and of the specialized work of the Department Bureaus do not fall to the United States alone, but to the family of nations, and it is possible to consume much more than the time allotted to me in the multiplication of these peaceful achievements of our Navy. Suffice it to mention, in concluding this phase of the subject, the laying of the Atlantic and Pacific cables, and the famine and relief cruises of the *Jamestown* and *Constellation* to Russia and Ireland.

The scope of the Navy's activities in its peaceful calling is broad. In the gov-

erning of Guam and of Tutuila there are many ways in which it is educating and promoting the welfare of its civilian employees and men in the service. The three training schools at San Francisco, Newport, and Norfolk take the young recruit, and in shaping and molding him for the peculiar needs of the Navy give him a good practical education. Each boy undergoes a course of instruction before joining the fleet, and once on board he is under the supervision of the officers as to his cleanliness, personal habits, and instruction, including every kind of athletics.

Ships are supplied with musical instruments and carefully selected libraries, containing reference books and historical and biographical treatises.

There are also at the more important recruiting stations classes of instruction for those interested in the practical sciences, such as mechanics, artificers, and electricians, and thus the men become proficient in their respective callings.

Obedience, manliness, and intelligent devotion to duty are the lessons inculcated in the mind of the enlisted man, and the Navy is today a veritable training school of the manual arts—an institution which confers upon its members the maximum of advantage consistent with the necessities of the service, and requires as tuition only the willing mind and patriotism of its recruits.

The educating processes are continually operating, not only aboard ship but in our navy yards and stations. The civilian employees, of which there are about forty thousand, find a broad scope for the exercise of their inventive genius and for the application of their technical knowledge and experience. Here, also, the Navy takes the young man under instruction, through an apprentice system, and offers the opportunity and incentive for him to adopt and to perfect a special occupation. Employment at navy yards is strictly on the merit system, I am glad to say; political influence can neither secure any privilege or precedence, nor enable an inferior workman to be retained when discharges are necessary. Promotion is by examination, and all of the thirty to forty thousand are directly or indirectly under the Civil Service Commission.

In addition to the maintenance of a practical training and educational system on board ship and in the navy yards and stations, the Navy has an educational adjunct at Annapolis, which, of itself, is an institution of learning of a high character. Founded by the Hon. George Bancroft in 1845, its membership has grown from fifty-six to about eight hundred. It has been of inestimable value to the naval service and to the country, and besides the technical training given to naval officers, it finds a general field of usefulness, together with other educational institutions, in the liberating and broadening influence it exerts, and in sowing throughout society in general its abstract ideas and principles, through the medium of the graduated personnel.

Closely allied with the Naval Academy, so far as one of its great objects is concerned, is the Naval Institute, founded in 1873. The fundamental idea in its establishment was "the advancement of professional, literary, and scientific knowledge in the navy," and that aim is being attained year by year in a most gratifying manner. It not only is an agency for the dissemination of knowledge throughout the service, but owing to the large number of associate members and members connected with foreign navies, its publications find their way without our own naval circles. They become the medium for an expression and interchange of ideas upon every timely professional question, and serve in no small degree to engender and foster a spirit of amity and partiality among the navies of the world.

Time forbids more than this passing mention of the many divergencies of the Navy in the past and present, which have augmented the world's scientific knowledge, stimulated universal trade, and promoted international comity, but perhaps enough has been said to indicate something of the spirit of enterprise and peaceful endeavor that breathes throughout this branch of the national power. The world is the beneficiary of the diversified activities of our Navy, and the

world has yet to reap the full fruition of its peaceful pursuits.

THE TOASTMASTER

There probably is no traveler, thinker, and writer better informed as to the social, political, and economic conditions East, West, North, and South, from any geographic point on the map of the world, than William Eleroy Curtis, or who has done more to educate the people of his own country with regard to popular geographic knowledge. He will respond to the toast of "The Greatest Event of the Year."

THE GREATEST EVENT OF THE YEAR—BY WILLIAM E. CURTIS

There is no doubt a wide difference of opinion as to which event of the year 1908 is of the greatest importance. It depends entirely upon the point of view. I know a young lady who considers her engagement to be married of greater importance than any other event that has occurred in a century, and I know a mother who thinks that the prize awarded to her boy in college is of greater importance than the discovery of a new world.

Unfortunately we have no common standard of comparison; we cannot measure the importance of events by rod and chain, nor compute the weight of influence by logarithms, or test the sincerity of congratulations by chemical analysis. A tear is composed of salt and water; a sigh is sometimes the result of external rather than internal pressure; and the Nobel Institute some years ago decided that the most important event in the physical world was the invention of a new method of correcting the errors of the mariner's compass.

A man who wants to fly will probably consider the success of the Wright brothers in the navigation of the air of greater importance than anything that has occurred down on this prosy old earth, and I know malefactors of great wealth who think that nothing could be of greater importance than the retirement from office of the present executive. To the people of the United States the event of most importance is the eight thousand million dollar crop that has just been harvested by the American farmers—a sum that is incomprehensible to the human mind—the largest reward that was ever received for human labor in any land in any age; but that is a mere local affair, and concerns the rest of mankind only indirectly. On the other hand, the voyage of the American fleet through all the seven seas is of more significance to other nations than our own, and is Theodore Roosevelt's method of advertising the fact that the United States is now one of the great powers of the earth.

Since July Fourth, 1908, it has been possible to travel in a railway car from Washington to the boundaries of Guatemala, and the President of that republic has recently made a contract with American engineers to connect the Mexican railway system with his own at Quesaltenango.

The Argentine Congress has appropriated two hundred million dollars for railway construction and other public works during the next five years.

Bolivia and Peru are both building new lines and extending old ones towards the Atlantic and to the north and southward within their own territory. Since the first of October it has been possible to travel by rail from La Paz, the capital of Bolivia, to the Pacific Ocean, and within two years one may go by rail from La Paz to Buenos Aires.

The first permanent court ever established to adjudicate differences between nations is now in session at Catargo, Costa Rica. The defendant in the case is trying to settle out of court, but Mexico, the United States, and three of the Central American republics are determined that a new precedent in international law is to be established.

The regeneration of Ireland is proceeding slowly but surely. The most important event in the United Kingdom during the year is the declaration of the policy of the Liberal government to spend five hundred million dollars more in breaking up the great estates of the Irish land-

lords and dividing them into farms for the peasant farmers and in building them comfortable homes. More than three hundred million dollars have already been spent in this work, which will make a total of more than nine hundred million dollars contributed by the British treasury to the peace and prosperity of the Irish people.

The venerable Francis Joseph of Austria celebrated the sixtieth anniversary of his reign by adding to his empire the former Turkish states of Bosnia and Herzegovina, which have been under Austrian protection since the war between Turkey and Russia in 1878, and while there are remonstrances from Servia, Bulgaria, and from some of the European powers, the opposition will finally concede the right of permanent possession.

The advance of constitutional government during 1908 has been extraordinary. The last of the autocrats has handed down his scepter to his subjects. The last of the absolute monarchies has collapsed. The political reformation of the world is not yet complete; sinners still sit in high places. But revolutions do not go backward, and authority once relinquished can never be recovered.

By reducing the number of voters, as has been done in the south, the revolutionary element has been eliminated from the Russian Douma, and the sessions of that body are now conducted with dignity and order. A budget has been voted; government loans have been authorized; the courts are being reformed; millions of dollars have been appropriated for education; the laws of the empire are being revised and codified, and although deprived of universal suffrage the Russians have a fair share of representative government, which experience will improve.

The Sultan of Turkey in July restored the constitution to the Turkish Empire and called a parliament to be elected by the people. The "Young Turks," led by his own nephew, now control the Sublime Porte. They have given Turkey freedom of speech, freedom of the press, and many liberties and political blessings that were never before known in that country. Protestants and Catholics, Greeks and Armenians, Jews and Gentiles, will have seats in the parliament, will participate in the administration of the government, and will probably be admitted to the army, both as officers and privates, which will forever prevent a Moslem fanatic from ascending the Ottoman throne.

The young Shah of Persia, who tried to repudiate the constitution and the parliament granted by his father a short time before his death, is now as much a prisoner in his palace as the Czar at Peterhof. Neither one of them dare pass outside the walls that surround him except in the center of a military guard. And while the Shah may interrupt the progress of reform for a brief period, his fate has been read in the stars, and it is only a question of time when his brief reign will be abruptly terminated. His situation is hopeless. The supreme ecclesiastics of the Established Church of Persia have declared that a constitution and a parliament and a complete change in the personnel at the palace are necessary for the well-being of Persia. They have excommunicated their sovereign, and the nominal head of their church, for violating an oath he took upon the Koran, and for profaning the sanctuary of two mosques in which members of parliament who were fleeing from his soldiers had taken refuge. There has been a good deal of comic opera mixed up with the tragedies at Teheran.

The first Persian parliament was not an ideal assembly. No business was transacted, no laws were passed, no legislative action whatever was taken, and the most important issues were ignored while the members relieved the pent-up indignation of a thousand years in vehement attacks upon their sovereign and the system of tyranny he represents. Instead of gently eliminating the insurrectionary element by restricting suffrage like the Czar, he hung and shot the Liberal leaders, he dispersed the parliament at the point of the bayonet, and thus scattered the sparks of revolution all over the land.

The greatest event of the year, perhaps the greatest for many years, has been the promulgation of a constitution and the promise of a parliament for China. The late Empress Dowager, under the wise and prudent advice of her cabinet, adopted a progressive plan of political reorganization covering a period of nine years, with the gradual evolution of a liberal representative government beginning in the municipalities and advancing annually until 1918, when the authority of the Emperor is to be shared with an assembly elected by the votes of the people. During this gradual development the people are to be educated to understand its purposes and its benefits, and modern methods of administration are to be introduced from time to time in the villages, the cities, the provinces, and at the Imperial Court. Following the example of the Japanese, the wise men of the East are seeking the light and the truth and the way, and an imperial commission, headed by one of the ablest men of his race, is now in this city with a staff of assistants investigating our executive, legislative, and judicial systems with a view to recommending those that can be applied to existing conditions in China.

Thus, civil and religious liberty, which all men so highly prize, is advancing with resistless force and with comparatively little bloodshed. A divine law, which was difficult to understand, seemed, in the past, to require that human freedom must be bought with suffering and sacrifice, but with the exception of Persia, these victories were won without the sword. The cause of civil liberty has made greater progress within the last three years than in any previous century, and the year 1908 will have to its credit the political regeneration of Turkey, Persia, and China.

THE TOASTMASTER

Our land is dotted with monuments erected to the memory of those who have won glory upon the field of battle, and justly so; but, while we are celebrating the achievements of a great fighting machine, let us hope for the time when greater honor will be paid to him that saves one human life than to him that takes a thousand, even though the cause of the latter be just. It is fit that the toast of "The Red Cross" should be responded to by a woman. She has ever been the one to make the greater sacrifice when a nation is suffering from the horrors of war; and her soft, soothing ministrations assuage the intensity of all pain. And so, as woman has had much to do in creating the leaders of courage, she has also done much to minimize its horrors, and we come to the toast "The Red Cross," by one who has done much to further the ends of the beneficent association—Miss Mabel Boardman.

THE RED CROSS—BY MISS MABEL BOARDMAN, DIRECTOR AMERICAN RED CROSS

The Charter of the American Red Cross says of its duties that it is to act in matters of voluntary relief, in accord with the military and naval authorities, as a medium of communication between the people of the United States of America and their Army and Navy. Therefore, it seems fitting that at a time when the achievements of our Navy are being toasted by so many of the people of the United States, the Red Cross should find a modest place.

But if you chance to be of a critical turn of mind, you may question what is the geographic justification for its intrusion here tonight. There is a reason, and a very excellent reason, too. Think for a moment: Is it a map or a chart of the country for which he is willing to give his life, that the sailor or soldier carries before him into the death struggle of battle, or is it not rather a symbol, a symbol that means to him, that means to all of us, wherever we may be, the land we love, that symbol—our flag! Possibly the sun now never sets upon the stars and stripes; that we leave for you wise geographers to say, but in God's good sunshine floats another flag, from the arctic regions to the torrid heat of the equator; over the peoples of the Orient and the peoples of the Occident, protected by the laws of nations, honored and respected by all the world, that flag of humanity—the Red Cross. And so,

as it covers the surface of the earth, don't you think it may have a little place in geography?

When Florence Nightingale wandered at night through those terrible wards of the great hospital at Scutari, the suffering men blessed her as she passed and called her "The lady of the lamp," but neither she nor they realized that she carried the light of a broader humanity, so soon to dawn upon the world. In 1864 this broader humanity took shape in the Treaty of Geneva, providing in time of war for the protection of hospital formations, with their personnel. Since then the Hague Convention has extended to naval warfare the provisions of this Treaty. Out of compliment to Switzerland, its flag was reversed, and the red cross on a white ground became this symbol of humanity.

Under this banner have grown the great Red Cross societies of the world—great in all the important countries save our own. The Japanese, for example, have 1,400,000 members; we, about 15,000. Millions of dollars fill their treasury and make them ever ready to cope with sudden disasters or with war, while we, practical people as we generally are, make the great mistake of believing that when war or great calamities befall us, all that is necessary is to open our generous American pockets and pour out the gold, regardless of the inefficiency of suddenly created bodies, the pitiful waste arising from ignorance and inexperience and the confusion and overlapping of the work of many committees.

Are we proud of our record in the war with Spain? On the one side, yes; on the other side, no. Had we the Red Cross Society we should have had, would so many of our brave boys have sacrificed their lives because of our neglect and lack of preparation, rather than from the enemies' bullets? We may look down upon Russia and Japan as not so far advanced as we in the march of human progress, but their record during the late terrible war (four years ago) puts us to blush. They gave up their lives to the shot and shell of the enemy, and not because of their own country people's neglect.

War may come; calamities will come, and the American Red Cross is striving to fit itself for the work our people will then call upon it to perform. It has created an Emergency Relief Board to study the methods and measures best fitted after great disasters. It has created a War Relief Board, whose duty it is to study war relief measures, what vessels are suitable and attainable for hospital ships, how hospital trains with operating cars may be acquired, and how to provide the necessary personnel of doctors, trained nurses, and hospital orderlies. It has provided for an International Relief Board, so that when great disasters occur among our sister nations we may be able to give help to them. Tonight I will not dwell on what it has done after great disasters, beyond saying that since its reorganization in 1905, it has assisted in relief work after eighteen national and international disasters.

By unanimous resolution in 1907, at the International Conference in London, the Red Cross Societies agreed to assist in the campaign against that most fearful pestilence, so often called "the great white plague." Today, like David of old, our Red Cross army, with only a little penny Christmas stamp, is going forth to join the fight against this devastating Goliath. Little that Christmas stamp may be, but twenty-five millions of them are flying through the mails, or waiting for the Christmas parcels, and at the same time calling out that glad message of good will to men to thousands of the poor victims who suffer from this fell disease.

In the greatest of all our national disasters, caused by the fire and earthquake in San Francisco, too much praise cannot be given to the work of the Army and Navy, the latter not only saving its all-important water front to the "City of the Golden Gate," but the officers in every way gave assistance to the unfortunate victims. Wherever now relief work calls the Red Cross into relation with the officers of our Army and Navy,

it receives their heartiest support and cooperation, and I am glad of this opportunity to express the gratitude of the Red Cross for their assistance.

I am tempted here to relate a little personal incident, and crave the forgiveness of the officer present: When this officer left the fleet he had commanded on its great voyage from our eastern to our western coast, he made his farewell speech to the men of his command. On his return to the East, a phonographic company requested a record of this speech, and this request was granted, but when they wished to send in return a generous check, the admiral refused to receive it, and requested that it be sent to the American Red Cross.

The other day, when I was selling the Christmas stamps at the post office, a rosy-cheeked, bright-eyed Jackie came along and asked for what the stamps were intended. When their purpose was explained, he exclaimed, "That's a good thing. I want to help that. Give me this much worth," pulling out a handful of uncounted change from his pocket. Do you wonder that the Red Cross loves the generous-souled Navy, from the Admiral to the sailor boy?

If the terrible misfortune of war falls upon us, may our Army and our Navy know that the Red Cross of America stands ready and prepared, with strong armies of human aid and sympathy, to fight for them against suffering and death. May it be ever ready, like some beneficent angel, to move amidst the carnage of war, unscarred, on its mission of love and mercy. Remember this: The wounded soldier lies watching and waiting, not for the flag of his own dear country, but for that other flag, whose coming may mean life to him, whose emblem is the symbol of love's sacrifice—the flag of the Red Cross—and may we be its standard-bearers.

THE TOASTMASTER

It is ever "the man behind the gun." Great achievement is only possible when power is intelligently directed; and there is but one thing that the American people are more proud of than they are of the technical skill and efficiency of the officers and men of the United States Army and Navy, and that is the high standard of personal integrity, of manly virtue, that is practically universal among the officers and that is reflected throughout all ranks and grades. Whenever the military arm of our Government is in control, there is honesty, efficiency, and a high standard of work; and our two military colleges are the pride of every patriotic American citizen. This toast of the "Navy in War" will be responded to by one who is a graduate of Annapolis, and now an honored member of Congress from Massachusetts.

THE NAVY IN WAR—BY HON. JOHN M. WEEKS, MEMBER OF CONGRESS FROM MASSACHUSETTS

The American Navy has been the most successful military organization, from its very inception, which the world has ever seen. That is a pretty broad statement, but if you will investigate you will find that it is absolutely true. There are good reasons for this.

In the early days we were a commercial people. We were natural sailormen. Our people lived along the shores. They made their money in commercial pursuits. The men who commanded merchant ships were not only good sailors; they were good merchants, and the foundations for many of the great fortunes of this country have come from that source. In order to protect themselves they were obliged to go armed. Their ships were armed as were privateers in time of war. The result is that they not only knew navigation, but they knew gunnery, and combined with these qualities the intelligence which makes great merchants.

Naturally, when those men came into positions where they commanded men-of-war, they were equal to the occasion, although they had had no naval training. As time went on they acquired a naval training, so that in the later wars, in the early part of the nineteenth century, they met every requirement, and in the recent

wars the graduates of the Naval Academy have been equal to every duty which has been imposed upon them. They have made a record of which every American citizen should be proud.

The American sailorman has always been efficient. They were good men in the time of the Revolution; competent men in the time of the War of 1812. They are better men today than they were in those days, because today ninety-five per cent of them are American citizens, and not a man is shipped in the American Navy who has not declared his intention to become a citizen. Twenty-five years ago not more than thirty per cent of our men-of-war's men were American citizens.

I like to think of John Downes, the first man in the service, having a name that has been borne on the naval register from the Revolutionary War to the present time. He was a boy, fifteen years old, when he went to sea with Paul Jones. When the *Ranger,* on which he served, returned to the coast of France after her encounter with the *Drake,* a lady asked him why his mother let him go to sea. He answered, "She did not let me go; she sent me." That was the spirit of the boys at that time.

I like to think of old Jack Robinson, Paul Jones' boatswain. When Paul Jones had made his memorable reply that he had just commenced to fight, he turned and said, "Jack, had we better surrender?" Jack replied, "No, sir; not while we have got a single shot left in the locker." That is the stuff that men behind the guns were made of in the old days.

I like to think of the spirit displayed by that old American admiral, Melancton Smith, who was a bureau chief during the Civil War. His son, Joseph Smith, was in command of the *Congress* in Hampton Roads when the *Merrimack* attacked the fleet. Word was brought to the Admiral that the ship his son commanded had surrendered. The only comment that the old man made was, "Then Joe is dead."

The American Navy has been successful because our ships have always been as good ships as any that were built in the world. Our merchantmen, in the Revolutionary times, and down to the Civil War, were the best merchant ships sailing the seas. They were, no doubt, as I said before, the best manned, and they made the fastest time. During the period of wooden ships, when we built men-of-war they were of the same general character. Our men-of-war, gun for gun, were equal to, and probably superior, those of any other nation. We had a period after the Civil War when we fell behind, but, notwithstanding all of the agitation today about armor belts and other criticisms, I am optimistic enough to believe that our battleships, ship for ship, gun for gun, are just as good as, if not better than, any similar ships in the world.

We have always been able to shoot better than most people. Go back to the early times, to the Revolutionary War. We lost twenty-four men-of-war, carrying less than five hundred guns, in the Revolutionary War, while the British lost one hundred and two men-of-war, carrying more than twenty-five hundred guns. We captured eight hundred of their merchant ships, and it is not too much to say that if it had not been for the damage caused by the American Navy we would not have won the Revolutionary War at all; that is, it might have been necessary later to have fought that war over again.

The same relative skill prevailed in the War of 1812. Our ships of the same class were superior to the ships of our opponents. This statement is confirmed when we study the exact figures. For instance, in the *Hornet-Peacock* contest, the British ship lost five men killed and thirty-seven wounded, out of a crew of one hundred and thirty, while the American ship had but three men wounded—this in eleven minutes. In the *Wasp-Frolic* fight the British ship lost fifteen men killed and forty-seven wounded, out of a crew of one hundred and ten, while the American ship lost but five killed and

five wounded from a crew of the same size.

I could mention a number of similar instances which demonstrate my statement that at that time we were able to shoot well, and we have been shooting better ever since. Not only the men of the North, but the men of the South, shot well during the Civil War; they shot well during the Spanish War; and we can shoot half a dozen times as well today as we could during the Spanish War. Admiral Evans could tell you that when Admiral Dewey went into Manila Bay, if his guns could have been as effectively used as they could today, that there would have been no necessity to withdraw and anchor for breakfast, for the work would have been finished before the breakfast hour. Never has the American Navy made such a record as it is making today, and never has there been a navy having a record excelling the one which our Navy is now making for capacity to hit the target. That is really the whole war problem—to hit what you are shooting at.

But while it is all very well, though it may not be profitable, to discuss the things which we have done in time of war, it is wise for us to consider those things which it will be necessary for us to do to prepare for and conduct future wars. At this late hour, while it will be impossible for me to discuss many of our requirements, I do want to refer to one or two of them.

We should make changes in the organization of the Navy Department. The Secretary of the Navy is here, and he would doubtless say to you, if he were not acting in his official capacity, that he thinks an organization could be made which would make the department much more efficient than it is today. We ought to facilitate promotion, so that young men will reach command rank earlier than they have in the past. Every man here will testify that when he was in the thirties he was a good executive in whatever capacity he was serving; that that was the period when he took responsibility lightly, and was able to do an unlimited amount of initiatory work. When he passed into the forties he became more conservative; he assumed responsibility with more hesitancy than earlier; and as he goes into the fifties, if he has not had placed on him up to that time heavy responsibilities, that he has become, instead of a confident man, a shrinking man to a degree incapable of assuming responsibility when it was placed on him.

The man in the twenties should be the watch officer of our ships; the man in the thirties should serve as navigator or executive; the man in the forties should be the commanding officer of our ships, and the man in the fifties should command our fleets. If that policy were followed and made elastic enough to fit circumstances, we would have men who were capable of assuming the responsibilities placed upon them. This responsibility is enormous. When a man commands a battleship which has cost ten millions of dollars, with hundreds of lives at stake, it requires nerve as well as capacity, and such places demand the best men we have in our service.

One more matter: We have not in the past built homogeneous fleets. We build a surplus of battleships and then provide the men to man them, and frequently provide more than we have ships for. We build auxiliaries and torpedo boats, if we do it at all, without any regard to the relation which such craft should bear to the battleship fleet, and while we have built or have in construction twenty-nine battleships, we have practically no means of furnishing tenders for them under service conditions.

When the battleship fleet was sent to the Pacific recently it was necessary to charter forty foreign ships to carry coal for it. If it had been found necessary to send the fleet around the Horn in time of war it could not have been attempted, because we could not have furnished American vessels in which to carry the coal.

Very few people realize the deplorable

condition we are in, as far as our merchant marine is concerned. If we had a large merchant marine we could draw from it without having special auxiliaries for the Navy, but we are so lacking in both that it makes our present situation almost hopeless.

When the Spanish War broke out it was necessary to purchase colliers and transports. One hundred and two vessels were bought at a cost of something over seventeen millions of dollars. In my judgment, they were well purchased, the board having this matter in charge being perfectly competent men; but they cost a very large percentage more than their market value, and more than twice as much as they could have been sold for if they had been put on the market at the termination of the war. In other words, we paid out millions of dollars because we had not provided ourselves with suitable auxiliaries for our battleship fleet.

We have possessions in the Samoan Islands which we have no means of reaching, because we have no merchant ships on the Pacific Ocean; so we are obliged to send men and supplies to our men in foreign ships. I noticed the other day that the Servian people were clamoring for war with Austria, when it was discovered that all of the ammunition Servia had was locked up in an Austrian fortress. We are in an analogous position, as we have recently chartered Japanese ships to carry ammunition and supplies to our possessions in the Philippine Islands. Ought not we to be laughed at and commiserated with for our own folly in allowing such a condition to continue? I think we should. These are some matters we should consider as well as battleships, and if I had my way I would provide for necessary auxiliaries before I provided any more battleships, if only one could be appropriated for.

I must ask your pardon for trespassing so long on your time when there are other speakers to address you. But this is an endless subject. We should have a Navy adequate for our needs; not only adequate in battleships, but adequate in every other respect, and I hope the men present, who have the power in their hands to provide it, will take this message home to themselves and help the good cause along.

THE TOASTMASTER

In all the annals of Polar exploration and research there is no more commanding and heroic figure than that of our own friend and member of the Board of Managers of the National Geographic Society, Major General A. W. Greely. He will say a few words about geographic research.

GEOGRAPHIC RESEARCH—BY MAJOR GENERAL A. W. GREELY, U. S. ARMY.

It is a great temptation to say many things when I come back after three years' absence to Washington and the National Geographic Society.

With the opening of the twentieth century things have changed, and, among others, geographic methods. A century ago geographic research meant only searching for new lands; but such has been the activity and energy of the men of the world that but few areas of importance are now without our knowledge. The field of geographic research has broadened. From seeking to bring back the nomenclature of capes, mountains, and valleys, we have come to know the wonderful facts relative to these valleys as bearing upon mankind and upon civilization. We have sought all the new fields of production and of consumption. We have brought back through the genius and skill of investigators the knowledge of what makes a crop successful here or there, and by further exploration in our own country have determined where better than ever before that crop can be raised. In other words, physical geography has been largely replaced by economic geography, which means the adaptation of natural resources to the benefit of mankind and to the development of civilization.

The National Geographic Society has lately entered upon a new plan—the de-

termination by a suitable system of medals to recognize and stimulate efforts for geographic research, whenever such work is original and important. That you will hear of in the future.

But now I wish to say a word or two of our sister service. We meet to celebrate the doings of the Navy. I was very glad to hear the Secretary of the Navy speak of the few wretched ships under the indomitable Wilkes which skirted the towering ice-cliffs of the Antarctic continent—a trip of most remarkable courage and endurance, which added materially to the sum of human knowledge. And it has been my pleasure on several occasions, in speaking of things now definitely accepted, to vindicate the claims of Wilkes to the discovery of that continent. His foreign critics—and there were many—said this and said that, but in an analysis written by me several years since I showed where European geographers had admitted that the case is fully and successfully proven.

And also the Secretary spoke of that great voyage of Rogers to the North Pacific and the icy shores beyond Bering Strait. There are others whom we might speak of in passing: of De Long, with his adventurous spirit, who sought to advance geographic research through the great waters of the Siberian Sea; Dr Kane, who went north through a spirit of humanity, under the gallant De Haven, to discover and succor the survivors of the Arctic expedition which went out under Sir John Franklin, and who later commanded an expedition of his own. And then there are others whom I will not dwell on further than to say that whenever an officer of the Navy has been sent forth on work of this and of a kindred kind, he has always performed it in such a manner as to elicit not only the praise of his country, but the honor and plaudits of the world.

But it is not alone the man of iron frame and physical endurance who has made us proud of human efforts to perfect knowledge of the ends of the earth, nor have such labors been confined to the ice-bound coasts of the polar world.

I prefer, myself, rather tonight to think of two representative men, of Strain and Maury—heroes of contrasting labors and of differing fates—Strain who, half a century since, lost his life in seeking to bring about the beginning of what then was called a dream, but which, through the energy and persistence of America, is soon to become a fact—the Panama Canal. And the work which Strain and the men under him did with great suffering was laying the foundations on which that canal will eventually be built.

And then of Maury, the man crippled in the activity of his life and forced to withdraw from the accomplishment of those results which are dear to every American, whose heart is filled with a desire to uplift the world and whose bosom throbs with a determination to do those things which are for his time and generation.

Barred from the dangers and toils of the broad ocean, his was a spirit that sought successfully to conquer, by avoidance and by adaptation, the twin demons of air and sea. You know the great outcome of his years of office labor and research. The storm and current charts of Maury have been of incalculable benefit to all seamen in the past half century and have made safer and surer all voyages.

All glory to the man, whoever he may be, who is strong enough and wise enough to be the master of his fate.

In ending I only desire to say that there are among us men able to do work which in the future shall be a credit to the country as there have been in the past. We speak of this as a degenerating age, as a time of materialism. I look on it as merely the development of a century of such resources that it will enable men to do those things which they consider highest and best, and I hope that in the years to come each and every member of this great society will exert his influence to see that these divinely inspired men shall be so aided and encouraged as to bring to fruition the great wishes of the world in making all its resources and products subservient to the improvement

and to the desires and aspirations of mankind.

THE TOASTMASTER

A stream can rise no higher than its source. Just as everything of which the human mind can form a picture—everything that has dimensions, everything from the largest planet of space to the ultimate atom of matter—is but the tangible expression of the thoughts of the Creator, so is every great human undertaking but the manifestation of the master mind that leads. Now the spirit that prompted a mere lad of the Virginia mountains, in 1858, to fight his way across the Western plains so that he might acquire a residence in the Territory of Utah and secure an appointment to the Naval Academy, is one that leads to success in any chosen profession. The fortitude that enabled the young cadet to remain true to the old flag when the nearest and dearest of kind cast their lots on the other side is worthy of the emulation of American youth. The physical and moral courage that enabled the young officer to volunteer for a hazardous service, and to lead his landed force from the sea front into the very muzzles of the firing guns at Fort Fisher, to pause long enough to staunch the flow of blood from a wounded leg, to press forward, to see his command shot away, to be one of the first seven men to break through the stockade, fall with the other leg pitifully shattered, to receive a third wound, and to half rise and shoot dead the man on the parapet who had several times wounded him, and then to be carried from the field as the flag of victory rose through the smoke of battle and waved its beautiful tresses over the broken ramparts of a defeated foe, fitted him to become the commander of the greatest fleet ever assembled under the orders of a single man. Fighting Bob Evans is no misnomer—it was bravely won. And, Admiral Robley D. Evans, we know that that indomitable spirit of yours is as ready tonight for a "fight or a frolic" as it was when you started across the plains in 1858, as when you charged at Fort Fisher, as when you stood upon the bridge in Chesapeake Bay and headed your magnificent armada toward the Pacific. The American people, and especially the National Geographic Society and its guests, know you, honor you, and love you. The Commander of the Fleet—Admiral Evans.

REAR ADMIRAL ROBLEY D. EVANS, U. S. NAVY.

I often regret that the course at Annapolis is not changed. I think naval officers ought to be taught to speak rather than to fight, so that they can answer on an occasion of this sort properly the wonderful descriptive list that has been given to me. I think probably I had better not say anything, and let it go as Professor Moore has put it.

But I cannot let this occasion pass without a word as to the Navy. I am not foolish enough for one moment to believe that my personality has anything to do with all this. It is because I have the honor to be an officer of the great national service. It is because you all love the Navy and appreciate the importance of it, which I pray you will do later on to a greater extent than you do now, that I have received the invitation to attend this dinner. So, as there are many Members of Congress and Senators here tonight, and as you say you are going to reorganize the Navy, according to Mr Weeks, I hope you will remember to put in some law by which naval officers shall be taught to speak.

My education in life has been along the lines of doing what I am told to do without answering back. Therefore when the President ordered the Atlantic fleet to go to California, I did not ask him why he wanted it to go. I doubt if he would have given me a satisfactory answer if I had.

I will only delay you a few moments to say a few words under one or two different headings and on the question of this reorganization.

If you reorganize the Navy, do it wisely, and remember that for command-

ing officers and admirals you need something except youth. Youth is undoubtedly a great asset in any business, and I wish somebody would invent a scheme by which we could work backwards and get to it again. So, gentlemen of Congress, in your wisdom remember that the young commander is better than the old commander, provided he has the experience of the old commander.

Now, just one word about your ships. There has been a good deal said lately about the condition of the ships. I have had much to do with it in the last ten or twelve years, and I want to say to you, do not lose any sleep about the condition of your ships. You can sleep perfectly well and with perfect safety in your beds over the present condition of your ships.

Now, about your men. The officers are too old; the men are too young. We have struck an average which seems to work pretty well. The men we are getting now from the Middle Western States, farmers' boys, are the best material that ever put on a blue shirt anywhere in the world. Now I want to say to you that I know these boys, and know them well. I have lived with them for years. I have rubbed elbows with them for years. I know what they are thinking about. They always appeal to the old man (and the captain is the old man to them), from the difficulty with his girl to the time he is going to have his discharge and go into the liquor business. And the old man has to advise them about all this, and I have done it hundreds of times. So I say to you that I know those boys well, and they are all wool and a yard wide, every one of them.

Now about this great cruise to the Pacific.

The people of this country are the most hysterical lot in the world. You were hysterical over the Spanish War, where there was not a particle of danger. You moved your silver away from the coast of Maine, believing the Spaniards were going to bear down on you and take it all away, when there was not a particle of danger about it.

Now about this cruise to the Pacific. We started out for a fight or a frolic, and didn't care which it was. We didn't want to fight. We had no ill-feeling toward anybody. But do not suppose for a moment that the Japanese would be foolish enough to challenge for a fight, and it has been proven since that they much preferred to be friendly toward us. I did not ask the President why he wanted to send the fleet to the Pacific. So I preferred to do what I was told, and took the fleet to the Pacific.

Some people imagined that we were going to break down. Some of our foreign friends were particularly anxious about us, and said that we would fill the harbors of South America with disabled battleships. But you notice that we didn't do anything of the kind. We started from Fort Monroe, and I assure you the greatest anxiety during the whole trip was on account of the measles. There was nothing during that entire trip that gave me as much anxiety as the measles and mumps and other children's diseases that these young western farmers had.

Some patriotic citizens of Canada informed me that we were to be blown up first on entering the harbor of Rio and later on in the Straits of Magellan. Letters came, usually without any signature, and it bothered me a little to know why the Japanese Navy should inform citizens of Canada that they were going to blow us up going into Rio, and if they did not succeed in that, they would make another attempt at the Straits of Magellan. Going into the harbor of Rio, the letters had been so positive that I thought, to use a familiar phrase, I would try it on the dog first. So I sent the colliers and dispatch boat in ahead to see if they might be blown up. But they were not blown up.

We had a delightful frolic from the time we left Hampton Roads until we entered San Francisco. We started out with about one-third of our crews green farmers' boys from the West, and when we began our target practice in Magdalena Bay, two days after we entered that bay, we broke every record ever made

in gun firing. That ought to be enough to convince any of those who are anxious about our training. We have got splendid gunners, as anybody who might have fired upon us on the way would have found out. We were ready to fight as well as to frolic.

Your fleet today is, in my judgment, as ably commanded as any fleet in the world can be. The flag officers of that squadron have, with one exception, three or four years to serve as flag officers. The captains of those ships have no superiors on this fair earth as captains of ships, and your men are the most intelligent and self-reliant set of men that ever wore blue shirts. And don't you be worried in the least if the President chooses to order that fleet to go around the world again. It will go, and it will be an unpleasant job for anybody who undertakes to stop them.

MEMBERS AND GUESTS PRESENT

The committee in charge of the banquet was:

Gilbert H. Grosvenor, Chairman
Alexander Graham Bell
Henry Gannett
J. Howard Gore
A. W. Greely
George Otis Smith
O. H. Tittmann
John M. Wilson
O. P. Austin
Charles J. Bell
John Joy Edson
David Fairchild
A. J. Henry
C. Hart Merriam
Henry F. Blount
C. M. Chester
F. V. Coville
Rudolph Kauffmann
T. L. Macdonald
Willis L. Moore
S. N. D. North
F. B. Eichelberger
John Oliver La Gorce

The members and guests present were as follows:

The Secretary of Agriculture, Hon. James Wilson
Mr and Mrs C. H. Ackert
Judge and Mrs Byron S. Ambler
Mr Byron Andrews
Judge Thomas H. Anderson
Representative Anthony of Kansas
Mr O. P. Austin, Chief Bureau of Statistics
Mrs Austin
Senator Bacon of Georgia
Dr Thomas Stockham Baker
Mrs Elizabeth Barber
Postmaster Barnes
Mrs Barnes
Mr W. M. Barnes
Mrs Kate Waller Barret
Hon. John Barrett, Director Bureau of American Republics
Representative Bartlett of Nevada
Rear Admiral John K. Barton, U. S. N.
Mrs John K. Barton
Lieutenant General J. C. Bates, U. S. A.
Dr Alexander Graham Bell
Mr Charles J. Bell, President American Security & Trust Co.
Mrs Bell
Representative Bennet of New York
Mrs Bennet
Mr and Mrs Claude N. Bennett
Mr and Mrs Benj. Blanchard
General John C. Black, Chairman U. S. Civil Service Commission
Miss Black
Colonel Henry F. Blount, Vice-President American Security & Trust Co.
Mrs Henry F. Blount
Miss Mabel Boardman, Director of American Red Cross
Mr W. J. Boardman
Hon. Charles J. Bonaparte, the Attorney General of the United States
Mr Scott C. Bone, Editor of Washington Herald
Mrs Scott C. Bone
Mrs S. O. Bonnill
Mrs Linnie M. Bourne
Mr Randolph Bourne
Rear Admiral R. B. Bradford, U. S. N.
Mr Charles S. Bradley
Miss Lora D. Brooker
Mr O. C. Brothers, Jr.
Mr Robert Brott
Miss Anna B. A. Browne
Senator Elmer J. Burkett of Nebraska
Mrs Burkett
Representative Burleson of Texas
Representative Burton of Delaware
Representative Theodore Burton of Ohio
The Minister of Costa Rica
Miss Maria Calvo
Rear Admiral W. L. Capps, Chief Constructor U. S. N.
Mr and Mrs John Doyle Carmody
Senator Carter of Montana
Mrs Carter
Colonel Thomas L. Casey, U. S. A.
Mrs Thomas L. Casey
Countess De Castelmenardo
The Minister of Chile
Madame Cruz
Mr and Mrs Melville Church
Rear Admiral Richardson Clover, U. S. N.
Representative Cocks of New York

Mr and Mrs H. W. Coffin
Mr Coleman
Representative Cook of Colorado
Mrs Cook
Prof. H. J. Cox, U. S. Weather Bureau
Mrs W. F. Crafts
Brigadier General Medorem Crawford
Mrs Medorem Crawford
Mr Harris M. Crist
Representative Crumpacker of Indiana
Senator Curtis of Kansas
Miss Curtis
Mr and Mrs William E. Curtis
Mr and Mrs Joseph R. Darling
Mr and Mrs O. E. Darnall
Mr Clarence W. De Knight
Mrs Jessie Job Dorphley
Mr and Mrs Arthur W. Dunn
General H. H. C. Dunwoody
Rear Admiral Robley D. Evans, U. S. N.
Mr John Joy Edson, President Washington Loan & Trust Co.
Mrs John Joy Edson
Mr and Mrs Thomas Edwards, Jr.
Mr Fred A. Emery
Miss Emery
Mrs E. K. Everett
Hon. C. W. Fairbanks, the Vice-President of the United States
Mrs Fairbanks
Mr David Fairchild, in charge of Agricultural Explorations, Department of Agriculture
Representative Fairchild of New York
Mr and Mrs Richard Lee Fearn
Mr and Mrs Herbert C. Felton of Camden, N. J.
Representative Foster of Vermont
Mrs David T. Foster
Mrs Charles O. Foster
Miss Foster
Mr Foutz
Hon. W. F. Frear, Governor of Hawaiian Islands
Mr W. R. Freeman
The Chief Justice of the United States, Mr Melville W. Fuller
Mr and Mrs H. K. Fullon
Mr and Mrs H. M. Fullon
Senator Gamble of South Dakota
Mrs Gamble
Mr Henry Gannett, Geographer of the U. S. Census
Miss L. D. Gill
Mr and Mrs H. A. Gillis
Colonel Green Clay Goodloe, U. S. A.
Major General A. W. Greely, U. S. A.
Mr Edwin P. Grosvenor
Mr Gilbert H. Grosvenor, Editor of the National Geographic Magazine
Mrs Grosvenor
The Minister of Norway
Madame Gude
Dr Almon Gunnison, President St. Lawrence University
Mr Arnold Hague, U. S. Geological Survey
Mr Robert N. Harper
Representative Haugen of Iowa
Miss Maxine Hawkins
Mrs S. A. Hawkins
Commander E. S. Hayden, U. S. N.
Mrs E. S. Hayden
Mr Henry B. Hedrick
Senator Hemenway of Indiana
Rear Admiral Joseph N. Hemphill, U. S. N.
Mrs Hemphill
Hon. John B. Henderson, formerly senator from Missouri
Mr John B. Henderson, Jr.
Miss Hersy
Rev. Joseph Himmel, President of Georgetown University
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General C. W. Hobbs
Rear Admiral Richard C. Hollyday, U. S. N.
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Mrs Holmes
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Prof. W. J. Humphreys, U. S. Weather Bureau
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Mrs Knapp
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Representative Knowland of California
Mrs Augustus Knudsen of Hawaii
Dr George M. Kober
Mr John Oliver La Gorce, Assistant Secretary National Geographic Society
Mrs La Gorce
Representative Lamb of Virginia
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Dr T. L. Macdonald
Commissioner Macfarland of District of Columbia
Mrs Macfarland

Dr W J McGee, Secretary Inland Waterways Commission
Mr John Holmes Magruder
Mr and Mrs Fred E. Mann
Representative Mann of Illinois
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John Ross Martin
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Rear Admiral Newton E. Mason, U. S. N.
Mrs Newton E. Mason
Mr and Mrs Spencer Miller
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Mr J. Walter Mitchell
Mrs Mitchell
Senator Money of Mississippi
Mrs H. E. Monroe
Representative J. Hampton Moore of Pennsylvania
Mrs Moore
Prof. Willis L. Moore, Chief of U. S. Weather Bureau
Mrs Moore
The Minister of Persia
Hon. Edward A. Moseley, Secretary Interstate Commerce Commission
Dr S. B. Muncaster
Mrs Ellen S. Mussey
Mrs Mary H. Myers
The Secretary of the Navy, Hon. Truman H. Newberry of Michigan
Mrs Newberry
Mr and Mrs S. C. Neale
Senator Nixon of Nevada
Mr and Mrs Stanton R. Norman
Bishop O'Connell, Rector Catholic University of America
Brigadier General John J. O'Connell, U. S. A.
Mr Richard V. Oulahan
Mrs Oulahan
Colonel Myron M. Parker
Representative Pearre of Maryland
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Representative Pollard of Nebraska
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Dr and Mrs Arthur T. Ramsey
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Mr and Mrs W. F. Roberts
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Mr Marvin F. Scaife
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Mrs Scott
Mr and Mrs John S. Scully
Miss Scully
Rev. Henry J. Shandelle, S. J.
Senator Simmons of North Carolina
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Representative Smith of Iowa
Senator Smoot of Utah
Mr and Mrs Edgar C. Snyder
Very Rev. Dr Spensley
Major George Owen Squier, U. S. A.
Mrs Helen A. Stebbins
Mr O. H. Stewart
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Mr and Mrs C. C. Swartz
The Minister of Sweden
Mr Henry Talbott
Mr C. Fitzhugh Talman
Mr W. B. Thompson
Lieutenant Timmons, U. S. N.
Mrs Timmons
Brigadier General Thomas M. Vincent, U. S. A.
Mr and Mrs Ernest G. Walker
Mr Hugh C. Wallace
Hon. Thomas F. Walsh of Colorado
Mrs Walsh
Mr B. H. Warner
Mr Vespasian Warner, Commissioner of Pensions
Mrs Warner
Senator Warner of Missouri
Representative Weeks of Massachusetts
Mr and Mrs M. I. Weller
Mr and Mrs Walter Wellman
Commissioner West of District of Columbia
Miss West
Mr Levi R. Whitted
Mr W. C. Whittemore
Mr and Mrs T. A. Wickersham
Dr H. W. Wiley, Chief Chemist, Department of Agriculture
Mr Gardiner F. Williams
Mr and Mrs Henry E. Williams
Mr and Mrs Sydney Williams
Mr Jasper Wilson
Colonel and Mrs M. A. Winter
Rev. Dr and Mrs Charles Wood
Miss Wood
Mrs Harriet De K. Woods
Mr K. W. Woodward
Mr and Mrs R. S. Woodward, Jr.
Mr Frank Wyman
Surgeon General Walter Wyman, U. S. Marine Hospital Service
Hon. Francisco J. Yanes, Secretary Bureau of American Republics
Miss Robyn Young

Photo from G. Harold Powell, Dep't of Agriculture

VIEW OF MOUNT ETNA FROM TAORMINA

The highest volcano in Europe, 10,835 feet. It occupies 460 square miles, and at its base has a development of 80 miles. Since Pindar reported its first recorded upheaval, more than 100 eruptions have occurred, some lasting for years. The most terrible was in 1669, when 40 square miles of fertile land were converted into a rocky waste and 20,000 people perished.

SICILY, THE BATTLE-FIELD OF NATIONS AND OF NATURE

By Mrs George C. Bosson, Jr.

LAND beloved of the gods and battle-ground of West and East, the later history of Sicily has had much to do in making the history of modern Europe. It is as peaceful now as its billows of gray-green olive branches typify—but so are there fires under Etna's snowy mantle.

Phœnicians, Greeks, Carthaginians, Romans, Vandals, Saracens, Normans, Spanish, Savoyards, Bourbons, Garibaldi, Italians—these have fought and ruled in sunny Sicily from 735 B. C. until this year of grace. Is it any wonder that Goethe declared Sicily to be "the key to all"—of mythology, tradition, history, of archæology, poetry, and Nature's perfect beauty?

The Parthenon at Athens has been wrecked and crushed by earthquakes and Turkish bombs, but in Sicily one may see Greek temples in nearly perfect grandeur yet, for wherever the Greek set his foot there rose temples and statues, theaters and amphitheaters, which the kindly climate and the hand of man have greatly spared.

But Greek or Roman matters not when one ascends that old hill of Taurus (hence Taormina's name), and among those Corinthian columns stands in a universe of blue! Blue heaven and blue sea, and to the right Etna in its majesty, a pearly cone against the dazzling azure; tawny rocks and a gray old town, splashes of pink where almonds bloom, and glossy green of lemon trees for miles and miles and miles. Somehow it never looks quite real, for each detail is in just the place to give artistic value to the whole.

And then what memories! The throne of Jupiter, Vulcan's workshop, the Titans' prison, the Cyclops' home—Empedocles in purple gown and laurel crown, and shod with golden sandals, walked here to meditate, and found his tomb beneath the cliff! Here sat the Greek, and after him the Roman, to hear the verse of Sophocles and Euripides. Later came Ibrahim the Saracen, and found no one to oppose his conquering march save an old bishop, St. Elia, kneeling to defend the city by his prayers! So "Allah Akbar" followed sonorous Greek verse, in turn to yield to Catholic devotions, when Count Roger d'Hauteville waved his victorious banner above the theaters' ruins.

MAGNIFICENT TEMPLES OF GIRGENTI

The old walled city of the middle ages crowns the hill, while out on the plateau, beyond the delightful Hotel des Temples and its old-world garden, the vast grandeur of the amber-pillared temples spreads. The billowing plain of emerald seems designed by Nature for great edifices, and in the dignity of solitude the gigantic ruins stand in their topaz glory. Ceres and Proserpine, Minerva and Jupiter, Hercules, Juno, Vulcan—all were worshiped here in the old Greek days when Girgenti (Agrigentum) numbered 800,000 souls. Now solitude has succeeded to the throngs and silence reigns, broken only by a caribiniero whistling "O sole mio" or by a little goatherd's singing as he cuts the cactus for his hungry pets. Asphodels and iris bloom where sandalled feet have trod, and the only votive offerings are the violets which the custodian's little daughter shyly offers the *signora*.

The Temple of Concord is almost perfect still, Doric in style, and of the same cream-yellow sandstone of which all were built. It stands on a natural rampart cliff, and beyond it are the walls which Virgil saw from the sea!

The Temple to Hercules was of the same size as the Temple of Concordia

Photo from Mrs Alexander Graham Bell

MESSINA, THE SECOND CITY OF SICILY, BEFORE THE EARTHQUAKE OF DECEMBER, 1908, WHEN 80,000 WERE KILLED

Messina was a modern city, built on the most ancient site of Sicily, but contained few remains of antiquity because of repeated earthquakes. The city was almost entirely destroyed by the earthquake of 1783. The houses extended along the shore, occupying a narrow strip of land between the water and hills, which were crowned by fortresses.

Photo from Mrs Alexander Graham Bell

A HUGE TUNNY FISH JUST LANDED AT SYRACUSE

These fish form a great source of revenue and also of food for the island

Photo from Mrs Alexander Graham Bell

THE TEMPLE OF CONCORD AT GIRGENTI (AGRIGENTUM), SICILY (SEE PAGE 97)

This is one of the most perfect surviving specimens of Hellenic art. At one time 800,000 people made this city their home. The Carthaginians captured Girgenti in 406 B. C., massacring 200,000 of its inhabitants. The town never regained its prosperity; 24,000 live there now.

(120 feet by 55 feet), and Doric also, but now only a single pillar is standing, surrounded by fallen masonry, huge columns, and great prostrate caryatides. Cicero says this temple was "exceedingly sacred and holy," and that the bronze statue it contained was the most beautiful he had ever seen.

But of all the temples of Girgenti (Agrigentum) that of Jupiter Olympus was the most remarkable. It was the largest in Sicily, and second only to that of Ephesan Diana.* There is not one stone upon another now—its ruin is complete—but from old chronicles some idea is gleaned of the Titanic proportions of its grandeur. Diodorus says it was 340 feet by 160 feet and 120 feet in height, while the flutings of the pillars would each admit the body of a man. On the eastern pediment was an alto-relievo of the Titans' war; on the western, the taking of Troy. Statues of giants with uplifted arms "sustained the ponderous entablature," and from this circumstance the city arms of Girgenti, three giants supporting a tower, derive their origin.

But what did Empedocles say? "My countrymen build as though they were to live forever, and live as though they were to die tomorrow." It was that living that caused the fall of the foremost city of Magna Græcia and its capture by the Carthaginians.

THE QUARRIES WHICH SERVED AS PRISONS

There is perhaps no place in Europe which has such a distinct individuality as Syracuse possesses. It is so easy, when one sees it, to understand its history, since so many important incidents occurred from its geographical peculiarities. Fourteen miles in circumference, it contained four separate towns. Facing them lay the island of Ortygia, and south came the great harbor and the marsh of Syraco. But the towns are now gray ruins on the hillsides, and the island is Siracusa today. Here came Diana's nymphs—Arethusa hiding as a fountain in the goddess' groves, Cyane changed to "a pool of dark blue water," as the poet sings, by Pluto when she tried to stay him in his flight with Proserpine.

The place is eloquent with history. What hosts have marched by! Marcellus broke the heart of Syracuse, when she was Athens' rival, and then to Greek and Goth, Byzantine, Saracen, Norman, Teuton, and Spaniard she fell an easy prey. The great hills look on the harbor and the harbor looks to the sky; the Spanish walls glitter now in the sunlight, and the portcullises of Charles V rise where stood the many-gated citadel of Pentapyla.

In the great galleries and underground forts of Euryalus castle the two years' siege is easily imagined; spacious quarters for troops, great courts for horses; here still the holes for hitching them, the great stone mangers for feeding. Stations for catapults and magazines, subterranean galleries, and long walled passages. Not a stone is missing in the long flights of steps; the apertures through which the Grecian arrows flew are perfect still. Archimedes himself planned those cunning sallyports—one high for a mounted trooper, one low for a foot soldier.

But Diana, protectress of Syracuse, had a festival, and the festival had Syracusan wine. With none on guard, at dawn of day Marcellus entered with his legions. Some one has written, "All Sicily was conquered in Syracuse," though it long continued the island's capital, and is mentioned by Cicero as "the greatest of Greek cities and the most beautiful of all cities."

The Syracusan latomiæ are almost impossible to photograph and equally so to describe. The Latomia del Cappucini is a hundred and more feet deep—solemn labyrinths with smooth, perpendicular, inexorable sides. These great excavations were the quarries for the builders first, then prisons for thousands of Athenian captives after the blockade of Syracuse. Old olive trees grow in the crevices now, ivy drapes and trellises the walls, pomegranates and lemons bloom at the bottom as in a sheltered garden, and the acanthus tangles its glossy, curling leaves. The scent of yellow jasmine

*See Nat. Geog. Mag., December, 1908.

overpowers one; it is like being in a conservatory open to the sky. Yet this sunken garden was once the sacrificial altar of a nation, where 9,000 proud Athenians were prisoners and slaves.*

THE EAR OF DIONYSIUS

In the Latomia del Paradiso is the cavern called the ear of Dionysius, from its resemblance to the human ear and the use to which it was said to be put. The story goes that Dionysius (the elder) caused this cavern to be cut, with cunningly contrived acoustic galleries, and high on one side, in a small aperture, the tyrant used to sit listening to the prisoners in their rocky cell below, gleaning their political secrets. The British antiquarian Holm believes that on the summit of this latomia Dionysius built a palace, from whence he could see and hear all that passed in the Greek theater below, as Louis XIV heard mass in his ante-chamber! But I cannot find upon what he bases his theory.

There was a tradition that some of the captives purchased their release by repeating the verses of Euripides, of which Lord Byron says:

"When Athens' armies fell at Syracuse,
And fetter'd thousands bore the yoke of war,
Redemption rose up in the Attic muse,
Her voice their only ransom from afar;
See! As they chant their tragic hymn, the car
Of the o'er-mastered victor stops; the reins
Fall from his hands, his idle scimitar
Starts from its belt; he rends his captives' chains,
And bids them thank the bard for freedom and his strains."

Out on the rough hillside lie huge fragments, like a rampart of Cyclopean defense, in reality remains of a great altar for the sacrifice of oxen to Jupiter—the greatest altar in the world except that of Pergamus, in Asia Minor, which ranked among the wonders of the world. Its vast size was not exactly due to excessive piety on the part of Syracusans, but rather a tardy expression of gratitude to Jupiter for deliverance from the tyrant Thrasybulus.

* See "Picturesque Sicily." By W. A. Paton. Harpers.

The beauty-loving Greeks built always on some high and spacious site, on a mighty sea-terrace or the verge of a vast open plain. How unlike the Roman! Just below Jupiter's great altar, but entirely without prospect, and enclosed by solid walls, are the ruins of the Roman circus. It is a large amphitheater, but is much less perfect than those of Pozzuoli, Verona, or Avignon, and possesses no special charm. The Roman lacked the epicurean spirit of the Greek, which demanded nature and art together to enthrall the senses. The Roman reveled in slaughter and delighted in carnage, and beauties of land and sea were naught to him. The mind of man is written in his nation's monuments; they are the records of a nation's qualities as much as is its history.

AN ENCHANTED GARDEN

In a limited sketch of a lovely land it is difficult to give a hint of all the beauties, where myth and history crowd close. Acres of blue lupins, rosy sea-pinks, yellowness of genesta mingle with the black lava streams of Etna, as fact and fancy are mingled in this old-world island. You see the rocks which Polyphemus hurled after Ulysses as he was putting out to sea, and then beyond, the bay where Alcibiades came sailing in with his Athenian fleet.

Not far from Palermo is Phœnician Solunto, a miniature Pompeii, and its situation is hardly surpassed by anything in Sicily, placed as it is between the wild heights of Monte Griffone and the curving coast, where Capo Zaffarano juts boldly seaward. Solunto must not be confounded with Selinunto, those tremendous ruins five hours away from Palermo. Selinunto was a city 628 B. C., and was destroyed by the Carthaginians 409 B. C. Its great ruins are in two groups, the Acropolis and its surrounding temples, and the three important temples on the opposite or eastern hill. They are all Doric, chaotic, and colossal, but bare and lonely; Virgil's "palmosa Selinus" is now sublime desolation.

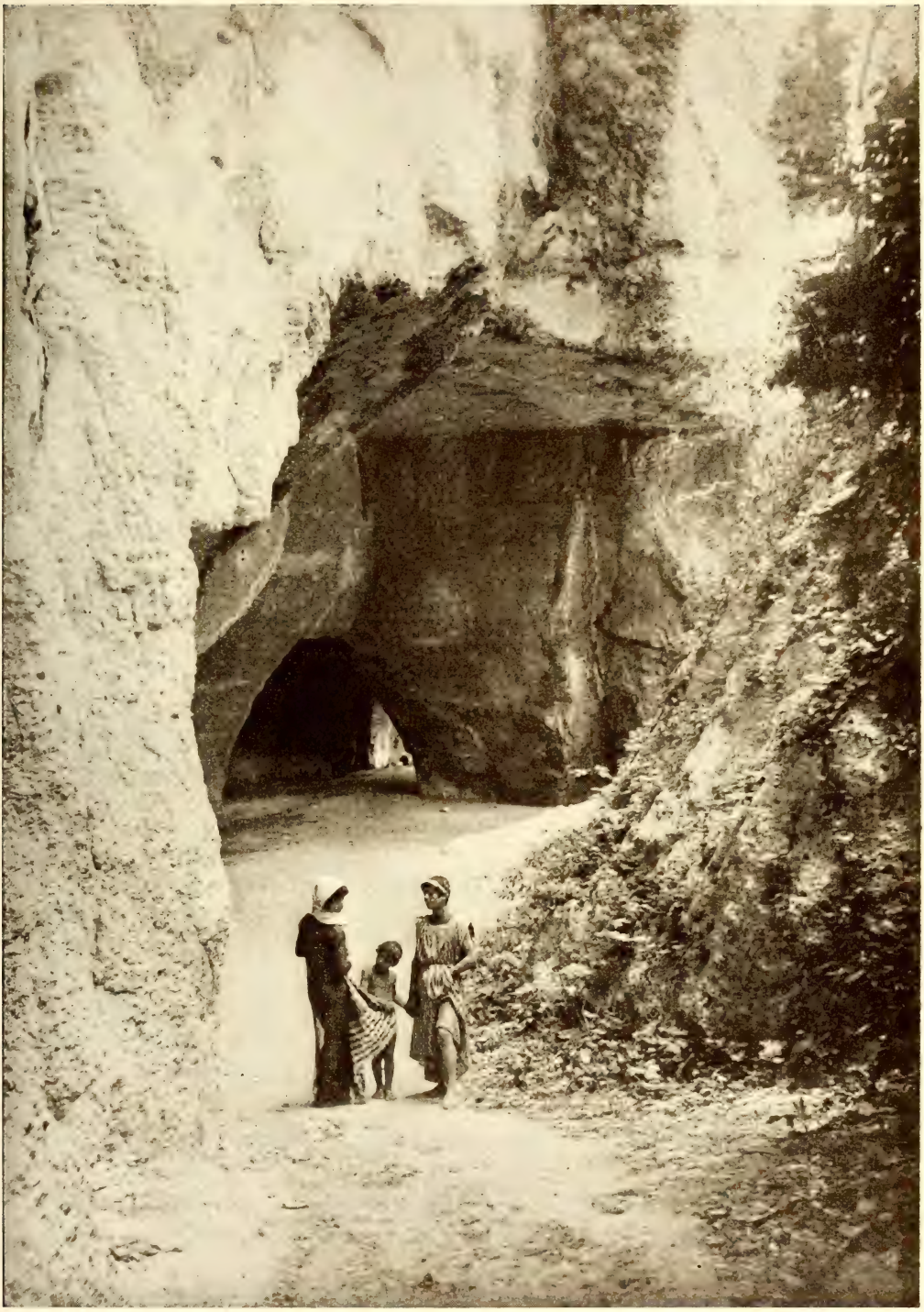


Photo from Mrs Alexander Graham Bell

STONE QUARRIES OF SYRACUSE

A corner of the stone quarries where 9,000 Athenians, the remnants of Nicias' army, were imprisoned by the Syracusans and left to die of thirst and starvation. La Latonia dei Cappuccini, Syracuse. The quarries cover many acres in extent, having been hewn from the living rock by multitudes of slaves.

Photo from Mrs Alexander Graham Bell

GROTTE DI SAN GIOVANNI, STREET OF SEPULCHRES: SYRACUSE, SICILY

Little is known of these curious burial places. Countless streets and galleries extend for miles in all directions, containing vaulted rooms, niches, and alcoves in which the dead were entombed. They were hewn out of solid limestone rock, whether by the Greeks, the Romans, or the Saracens, authorities do not agree.

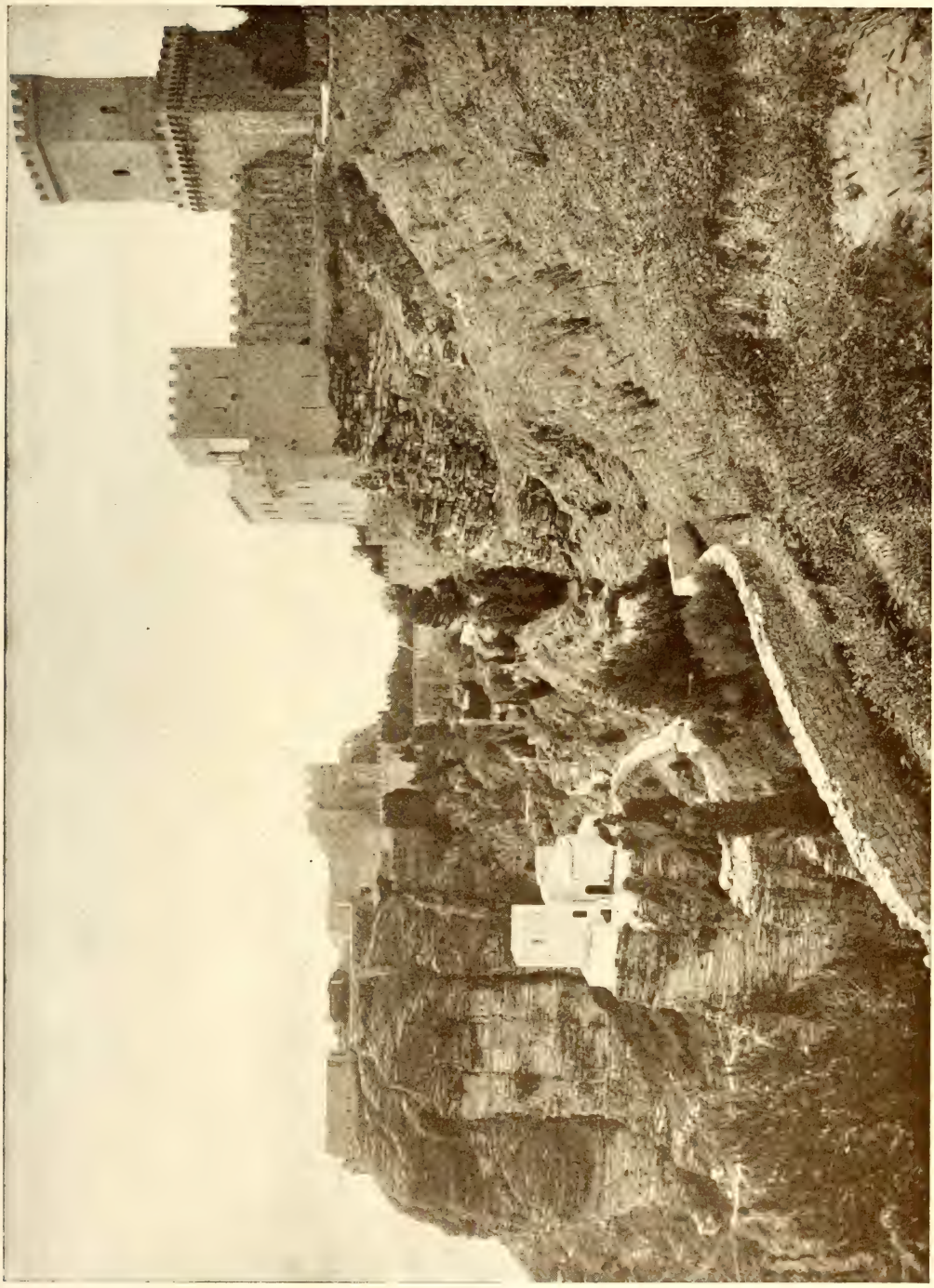
Photo from Mrs Alexander Graham Bell

RUINS OF ONE OF THE GREAT TEMPLES AT SELINUS OR SELINUNTO (SEE PAGE 118)

Selinus for years rivaled Syracuse in wealth and luxuriousness. The people spent more money, however, on their magnificent temples than on their fortifications, with the result that Hannibal II captured the city in 409 B. C., and nearly every man, woman, and child of its half million inhabitants was massacred by the Carthaginians.

ON THE SHORES OF SUNNY SICILY Photo from G. Harold Powell, Dep't of Agriculture

Sicily enjoys one of the happiest of climates. Those portions which are clothed with trees or shrubs are always green. In olden times it was called the "granary of Europe"



A TYPICAL MEDIEVAL CASTLE IN SICILY

Photo from Mrs Alexander Graham Bell

THE CAPITAL OF SICILY

Palermo "la felice" is a gem of a city, to me second only in beauty to the pearl of Ceylon, Colombo. Approached from the harbor, the Concha d'Oro lies in front, that shell-like plain, like a gigantic garden, with Monte Pellegrino's red crags on the right, Capo Zaffarano's wooded heights across on the left, while Monte Griffone's dark range fills the background. Modern Palermo is a medley of dark old streets and wide new ones, of Moorish domes and modern marble mansions, of labyrinths of alleys and a broad, beautiful Marina, while no other city of its size possesses such splendid parks and public and private gardens.

"Panormus"—all harbor—was the ancients' name of Palermo, which would indicate its Greek origin, though from earliest inscriptions there is good authority for believing it a Chaldean colony to begin with. Whatever its stem, its Greek, Roman, Gothic, Saracenic, and Norman occupations have left marked traces on the City of the Golden Shell.

The most exquisite jewel in Palermo's casket is the Capella Palatina, built at the command of Roger, Sicily's first Norman king, and son of Count Roger d'Hauteville the Cortez and Pizarro of his time. It is a melody of mosaic art, this chapel in Palermo's royal palace. Not an inch of the surface—floor, walls, cupola, or roof—but is gemmed with exquisite work. Its colors are softened and blended with age, until it suggests some Oriental sheik's tent of cashmere embroidery. Beside the pulpit stands a very ancient carved white candelabrum 14 feet high, and near the choir steps swings a magnificent repoussé silver lamp, gifts of King Roger to this jewelled chapel his fairy wand created. It was in this chapel that Marie Amelie, daughter of Ferdinand IV of Naples, was married to Louis Philippe, then Duke of Orleans, afterward king of the French. The splendid pyx was presented by him on attaining the throne.

The Saracenic conquerors have left their trace in the palaces of La Ziza and La Cuba, and in La Cubola, the latter a small vaulted pavilion in the gardens of La Cuba, and the most perfect Saracenic work in Sicily. The palaces are barracks now and their beauties have vanished, but at La Cuba it was that di Procida found his lost love, as described by Boccaccio.

The structure about which perhaps centers the greatest interest is the picturesque ruined church of San Giovanni Degli Eremite, built by King Roger, and possibly partially constructed from some old mosque, for there are five round cupolas of the same form that one sees in all Mohammedan countries. Moor and Norman are dust and ashes and the lovely cloisters where the monks once paced and meditated are only a garden now. Within sight of San Giovanni, outside Porta Santa Agatha, is an old cemetery, and inside its walls the remains of a Cistercian monastery founded by the English Archbishop Walter of the Mill. Grim legends haunt this place. On Easter Tuesday, 1282, while the monastery bell rang for vespers, occurred that gory massacre known as the Sicilian vespers, the slaughter of the French. From Palermo the fury spread over all the island until thousands of the French were slain, and Charles of Anjou lost from his crown his "jewel of the Mediterranean."

Mafia and bandits and brigands are popularly supposed to flourish in Sicily, but a carriage trip into the heart of the mountains, to the town which is still Greek, Piano dei Greci, failed to furnish adventure or a modern Claude du Val! The inhabitants of this mountain town are Albanian still, Orthodox Greek in religion, and retaining some hints of Greek peasant dress. We proved quite as much of a sight to the mountaineers as they to us, and so closely did they crowd about the camera that snap-shots were made with difficulty.

Above the city of Palermo, on a cliff almost overhanging the Concha d'Oro, stands that triumph of ecclesiastic builders, the Cathedral of Monreale, Santa Maria Nuova, the greatest monument to the glory of William the Good and his

Photo from Mrs Alexander Graham Bell

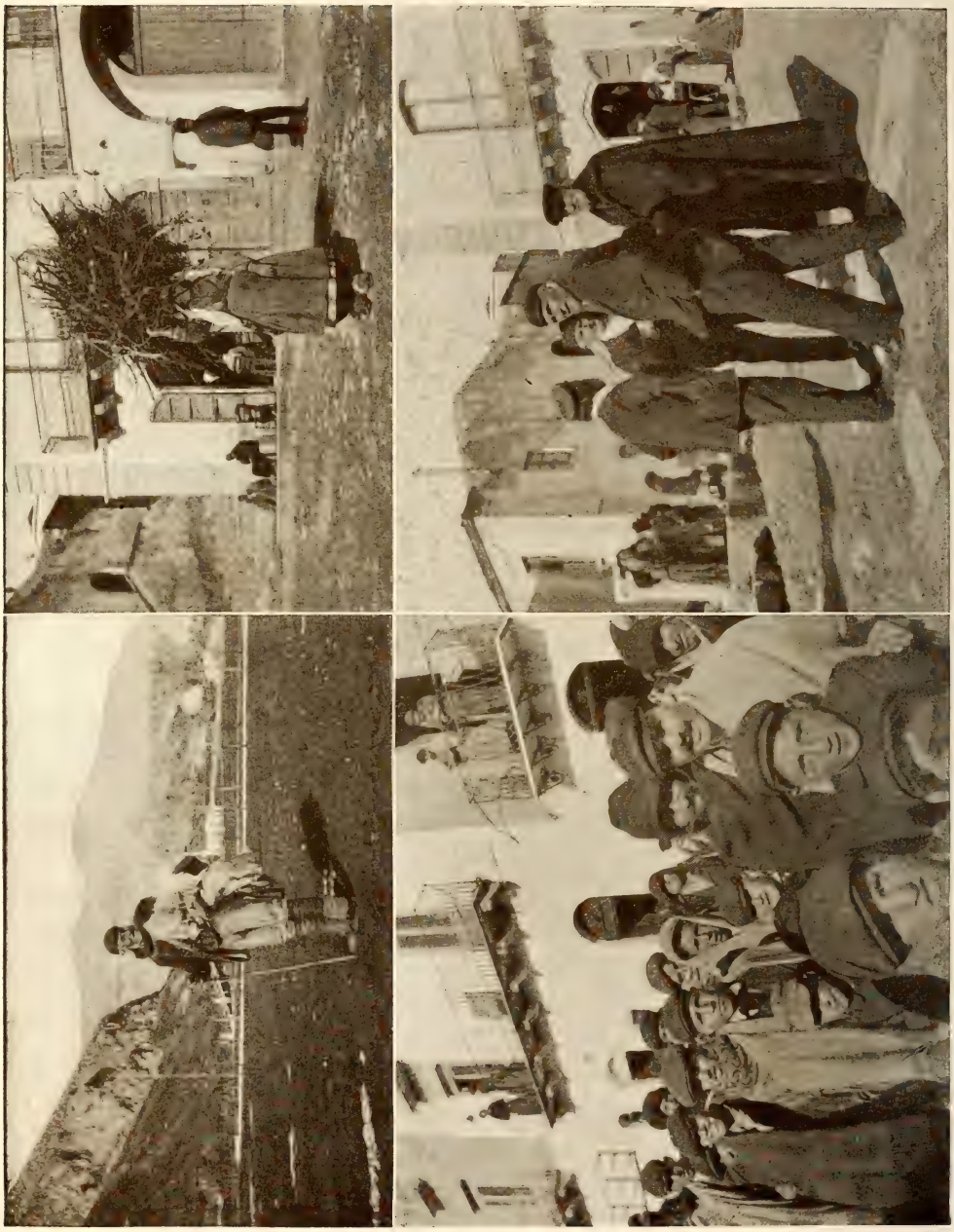
GOAT-HERDS IN SICILY

Photo from David Fairchild, U. S. Dep't of Agriculture

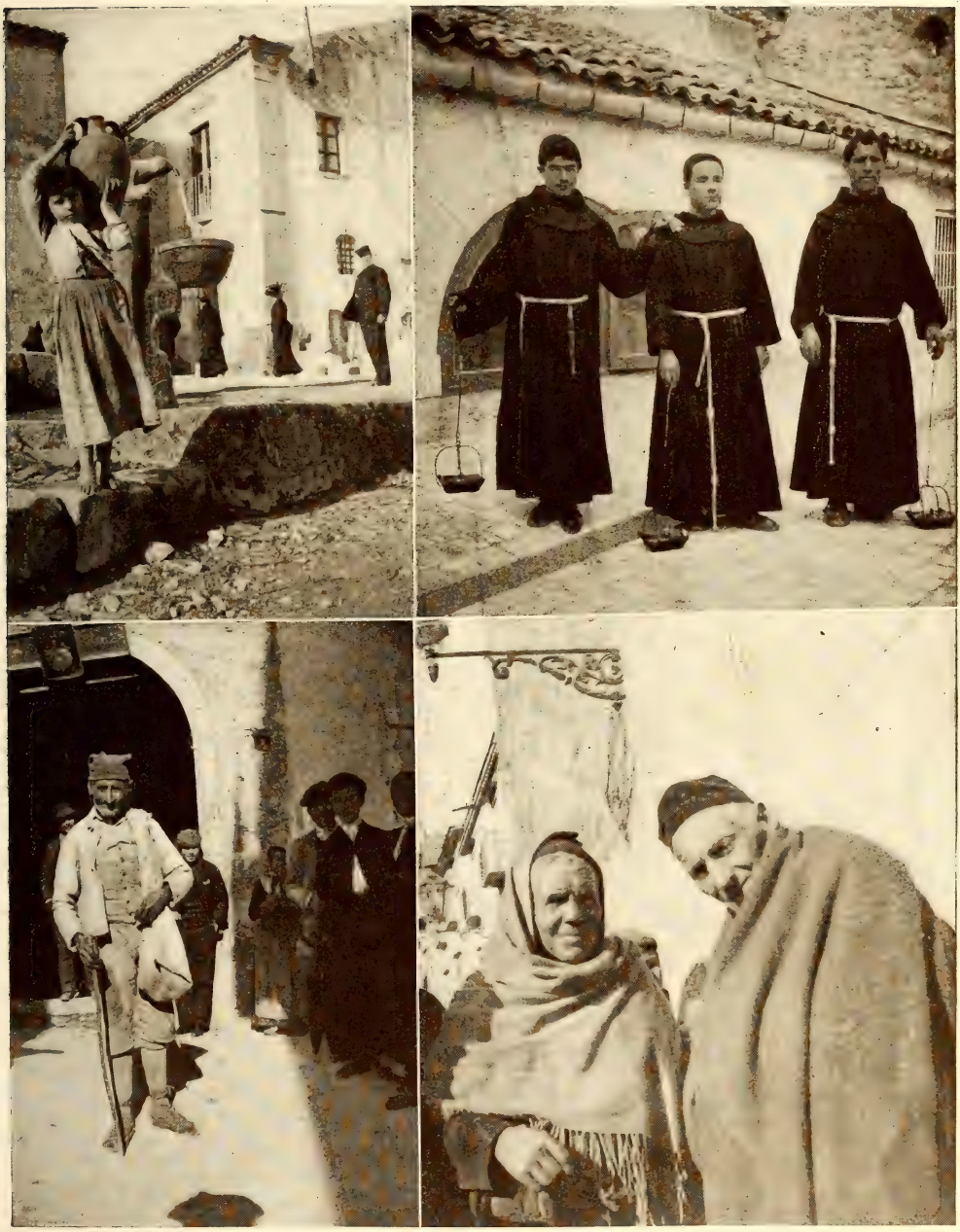
QUAINT COSTUMES FROM REGGIO, CALABRIA, SOUTH ITALY, BEFORE THE EARTHQUAKE OF 1908, WHICH UTTERLY DESTROYED THE CITY

Photo from David Fairchild, U. S. Dep't of Agriculture

LADIES IN REGGIO, CALABRIA, SOUTH ITALY, BEFORE THE EARTHQUAKE OF DECEMBER, 1908



A GOAT-HERD SCENES IN TAORMINA, SICILY Photos by Mrs George C. Bosson, Jr.



Photos by Mrs George C. Bosson, Jr., and Madame Helene Philippe of Chicago

SCENES IN TAORMINA AND SYRACUSE, SICILY

The poverty of Sicilians today is a sad contrast to the wealth of the islanders in ancient and medieval times. The soil is as productive as in the days when Sicily was the garden of the Mediterranean.

Photo from Mrs Alexander Graham Bell

A SICILIAN TYPE

Photo from Mrs Alexander Graham Bell

A GIRL OF SICILY

Photo from Mrs Alexander Graham Bell

A DESCENDANT OF THE TYRANTS OF SYRACUSE

mother, Margherita of Aragon. Around the cathedral and its adjoining monastery has sprung up gradually a considerable town, from whose rocky heights the inhabitants look down upon an earthly paradise. The exterior of the cathedral is plain and simple, giving no hint of the glories within, dependent on no one school of art for its magnificence. The splendid church is the work of Norman-Sicilian artists, is Latin in shape, Roman in its colonnade, Byzantine in its mosaics, Greek in its sculpture, Saracenic in its mouldings. Eighteen of the oriental granite columns were taken from Greek and Roman temples. Walls, arcades, and vaultings are one solid incrustation of Byzantine mosaic on a gold ground, its jeweled splendors blazing in glowing richness of tone, blended and modified to calculated harmony.

The memories of its many artists invest Monreale with peculiar charm. Adjoining are the cloisters of the ruined monastery, superb examples of the twelfth century art. Four hundred and thirty-two richly carved and inlaid columns surround this old retreat of Benedictines, their home in days when the monasteries were the conservators of all that was best in all the arts. Wonderful as is Monreale, with its treasures of art, it is still more wonderful to realize the situation of this superb creation. The world has paid but little attention to the chronicles of Sicily; its history is a sealed book to most of us, and we are prone to ignore the debt which all civilization owes to that dynasty of Norman kings, the most powerful, the richest, most enlightened of their day.

THE RUINS AT SELINUS

MARION CRAWFORD in his fascinating history of Sicily, "The Rulers of the South," gives the following account of the ruins at Selinus:

It was between 480 B. C. and 409 B. C. that the great temples of Selinus, of Segesta, and of Akragas were built, edifices which surpassed in size and solidity almost every building of the sort in the Greek world.

There is nothing in Europe like the ruins of Selinus. Side by side, not one stone upon another, as they fell at the earthquake shock, the remains of four temples lie in the dust within the city, and the still more gigantic fragments of three others lie without the ruined walls. At first sight the confusion looks so terrific that the whole seems as if it might have fallen from the sky to the world, from the homes of the gods to destruction on earth—as if Zeus might have hurled a city at mankind, to fall on Sicily in a wild wreck of senseless stone.

Blocks that are Cyclopean lie like jackstraws one upon another, sections of columns twenty-eight feet round are tossed together upon the ground like leaves from a basket, and fragments of cornice fifteen feet long lie across them or stand half upright, or lean against the enormous steps.

No words can explain to the mind the involuntary shock which the senses feel at the first sight of it all. One touches the stones in wonder, comparing one's small human stature with their mass, and the intellect strains hopelessly to recall their original position; one climbs in and out among them, sometimes mounting, sometimes descending, as one might pick one's way through an enormous quarry, scarcely understanding that the blocks one touches have all been hewn into shape by human hands and that the hills from which men brought them are but an outline in the distance. But as one reaches the highest fragment within the Acropolis, the plan of the whole begins to stand out from the confusion; the columns have all fallen in ranks, and in the same direction, and from the height one may count the round drums of stone which once composed each erect pillar. There is method in the ruin and a sort of natural order in the destruction.

No earthly hands, bent on blotting out the glory of Selinus, could have done such work, neither crowbar and lever of the Carthaginian, nor the giant-powder of the modern engineer. Nature herself did the deed. In the morning the seven temples of Selinus were standing whole and perfect against the pale and dazzling sky; at noonday the air grew sultry and full of a yellow glare, the sea lay still as liquid lead, and the sleeping beast in the field woke suddenly in terror of something far below, that could be felt rather than heard; an hour and more went by, and then the long, low sound that is like no other came up from the depths of the world ,and the broad land heaved like the tidal swell of the ocean, once, twice, and thrice, and was still, and a great cloud of white dust hung where the seven temples had stood. As they fell, so they lie and will lie for all time, a very image of the abomination of desolation.

SKETCH MAP OF SICILY AND SOUTH ITALY

The National Geographic Society has sent Mr Charles W. Wright, of the U. S. Geological Survey, to Sicily to study the earthquake which wrought such havoc around Messina and Reggio. Mr Wright's report will be published in an early number of this Magazine.

This most terrible earthquake in the history of the world was apparently caused by the gradual sinking which is taking place in a small area, about 75 miles in diameter, which includes the strait of Messina, the northeastern tip of Sicily, and the toe of Italy. This small area is a remnant of the ancient Tyrrhenian crust block, and has been periodically settling for ages. The earthquakes will recur until this remnant has disappeared.

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THE NATIONAL GEOGRAPHIC MAGAZINE

KALEIDOSCOPIC LA PAZ: THE CITY OF THE CLOUDS

BY HARRIET CHALMERS ADAMS

With Photographs by the Author

ALIGHTING from the train at Alto La Paz, I looked in vain for the city. A railway station, three old-fashioned stage coaches awaiting city-bound passengers—but where was "La Paz de Ayacucho," the metropolis of Bolivia?

On either side of the track a dreary brown plain seemed to stretch unbrokenly to the snowy range of the Andes. There was not a trace of verdure, not a single habitation in sight beyond the forlorn little station-house. It was bitterly cold, for Alto La Paz is 13,000 feet above the sea, and while my fellow-traveler attended to the luggage I walked rapidly along the road, hoping to "thaw out."

Suddenly, to my amazement, I found myself on the brink of a deep canyon, a cut in the plain, heretofore imperceptible. Across the gorge the mountains towered skyward, while far below, in the narrow valley, lay a red-roofed city. A steep, serpentine wagon-road led from heights to valley, and on this highway I could discern moving objects toiling upward.

It quite takes one's breath away, this unexpected view of La Paz, and on intimate acquaintanceship the place retains the unique charm of this first impression. No other New World city resembles it, and it has few rivals on earth in picturesque diversity. Although protected from the icy blasts which sweep across the bleak plateau above, La Paz is a city of the clouds, elevated nearly two and a half miles above sea-level, and the traveler bound thither will do well, when equipping, to prepare for a land where it is *always* winter.

Until recent years highland Bolivia was a hermit republic, reached only after a long and difficult overland journey. Now one can climb to the Andean uplands by rail, and this year can even descend from Alto La Paz to the city by trolley. The local color, however, has not as yet been greatly marred by that buccaneer and despoiler of natural beauty, modern civilization.

On leaving the heights our stage driver decided to win in the race to town and lashed his mules into a gallop. I sat on top of the coach, expecting to have a splendid view, and held fast to the seats' railing—and my breath—as we dashed down the steep, zig-zag road. We won the race, even arriving intact, but alto-

AT THE RAILROAD STATION: LA PAZ

gether missed the scenery, as the coach was enveloped in a cloud of dust during the entire journey.

Our lodging place, an annex of the Hotel Guibert, was a stately old edifice, evidently the residence of a Spanish grandee in the days of the vice-royalty. A crest surmounted the doorway and a massive marble stairway connected the inner court-yard with the dwelling rooms above. Our windows opened on a narrow Old World balcony, overhanging the street, from which we next day viewed a passing play of great interest and variety —a play staged and costumed by a master hand.

The curtain was rung up in the early morning, distant trumpeters announcing the prologue. Hurriedly throwing on a dressing gown, I rushed to the balcony to see the Bolivian regimental band marching down the hill. For a half hour the brilliantly uniformed soldiers played in the plaza opposite our windows, and sweeter music I have never heard. In the clear highland atmosphere the notes had an unusual quality. Often in a minor key, the music seemed expressive of the sorrows of the Andean people rather than of their victories.

As the soldiers marched away the water-carriers gathered by the fountain in the center of the plaza, filling the immense copper jars which they carried on their backs. They were Indians, full-blooded Aymarás, descendants of a people conquered by the Incas. The origin of their ancestry is shrouded in mystery, but many ethnologists believe them to be descended from the earliest American aborigines known to us, the builders of Tiahuanaco, now in sand-swept ruins not far from Lake Titicaca.*

The costume of the water-carriers was certainly unusual. It consisted of jackets and short trousers of homespun,

* See NATIONAL GEOGRAPHIC MAGAZINE for September, 1908.

COURT-YARD OF THE HOTEL IN LA PAZ, FORMERLY A COLONIAL MANSION

the latter slit at the knees and pieces of cotton cloth inserted, permitting greater freedom of action in hill climbing. The men were bare-footed, but their heads were well protected from the severe cold by skull caps of vicuña wool worn underneath felt hats. These caps and the woolen ponchos covering their broad shoulders were multi-colored, and with the shining copper jars they presented a gay figure. The skin of these Andean highlanders is a russet brown in shade, the hair straight and black, while their features bear a striking resemblance to those of the Tibetan on the Himalayan plateau.

As the water-carriers started up hill on a trot, bowed down under the weight on their backs, we had an "intermission for refreshments." Unlike a breakfast in the States, this early repast consisted only of thick, sweet chocolate and unbuttered rolls, served in our room by a *pongo*.

This odd character is an Aymará, who is a relic of the Colonial days, when the cruel *repartimiento* and *mita* systems were enforced by the Spaniards. The *repartimiento* was the distribution among the natives of articles of European production—a source of oppression and fraud. The Indians were obliged to pay exorbitant prices for articles utterly useless to them. Far more oppressive and cruel was the *mita,* consisting of forced labor in the mines and plantations, where the poor Indians died by the thousands from over-exertion and ill-treatment.

Another sort of compulsory labor was domestic service in the homes of provincial authorities and priests. These house servants were called *pongos,* and a modified form of this service exists today in La Paz. A friend of mine, who rented a house in the city, found that one of these servants went with it, a new one for

ON THE HEIGHTS OVERLOOKING LA PAZ: MOUNT ILLIMANI IN THE DISTANCE

ON THE ROAD TO LA PAZ

IN THE HIGHLANDS OF BOLIVIA, NEAR LA PAZ

each week in the year, as her landlord sent his country employees into town, one by one, for a week's holiday. The *pongo* performed odd services about the house and slept on a mat in the courtyard, guarding the entrance. Some of these men had villainous faces.

My friend was desirous that her mother in New York should visit her, but the man of the house was not as enthusiastic over the plan, so he sent on a photographic group of the family servants, the *pongo* well in the foreground, and the mother-in-law indefinitely postponed her visit.

The *pongo* who served our breakfast had evidently just arrived in town, and the broad grin on his stupid face betokened enjoyment of his vacation. He could not speak Spanish, and we possessed little knowledge of the Aymará tongue, but his never-changing smile and our wild gesticulations answered all purposes.

The sound of shouting in the street brought me back to the balcony to see a llama-driver urging his flock down-hill. Slowly and gracefully the strange little mountaineers descended, casting furtive glances to either side. Stately, silent-footed, wearing an expression of great curiosity, the llamas, with their big cousins, the camels, are the only burden-bearers with pride unbroken. They carry their heads with a regal air. In coloring they are black, brown, tan, or white, often wearing a brighter touch in ear ribbons and small ornamental bags hung about the neck.

No sooner had the llamas departed than I beheld, crossing the plaza, the gorgeous Bolivian belle of my dreams, the Chola girl. My impulse was to rush down to see if she were real. Of mixed Indian and Spanish blood, the Cholos form the greater portion of the population of La Paz. Industrious and loyal, the men are good citizens and excellent

A STREET PEDDLER OF LA PAZ

soldiers. The women are often merchants in a small way, but devote most of their attention to personal adornment.

It is all a question of geography, and while the London "Arriet" spends her earnings on her bonnet and the East Side New York damsel pines for imitation jewelry, the Chola's petticoats are her pride and wealth. She wears one over the other, each of a different brilliant hue—twenty-five, I believe, is the record. Short, plump, and bright of face, with two neat black braids hanging from under a round straw hat, her head is as attractive as her pretty little feet. She seldom wears stockings, but her shoes are high-heeled importations of colored leather, often ornamented with red and yellow kid butterflies. All other splendor paled, however, as I gazed at those marvelous skirts displayed to great advantage on the hilly streets of the city.

In utter contrast to the merry faced Cholas, so sumptuously bedecked, were the aristocratic señoritas bound churchward, wearing black garments and a devout expression. They passed under our balcony in the morning, their sweet, pale faces half hidden by the *mantos* draped about their heads; but in the late afternoon, when there was music again in the plaza, they blossomed out in Parisian gowns and beflowered hats. As they walked around the square, well chaperoned, the youth of the city paid tribute to their beauty.

In the Latin-American countries, where the freedom of acquaintance existing in America between men and women is unknown, the early stage of courtship is the language of the eyes. It is perhaps as well that the lover first woos his lady fair with tender glances. Were he obliged to call on her often, conversing

A CHOLO BOY OF LA PAZ

at length in the drawing room, his devotion might wane, for there is no method employed of heating rooms artificially; no furnaces, stoves, or fireplaces in any of the native houses. For culinary purposes braziers are employed, charcoal and the *taqui* of the llama being used as fuel. A compassionate American, forever enshrined in my memory, loaned us a coal-oil stove just imported from the States, and our first evening in the city, and all that followed, were spent in close proximity to this beloved heater.

We found the little fur shops an attractive feature of the town. Tawny vicuña and silvery chinchilla skins adorned the walls. The chinchilla is becoming scarce and its coarser relative, the viscacha, is sometimes sold to unwary customers as a substitute. Like all animals whose skins have a high market value, the chinchilla has been killed in and out of season and is destined to extinction. The ruddy, silky fur of the vicuña has few rivals in beauty and was greatly valued by the Incas. In their day this wild cousin of the llama, of the original cameloid stock, was hunted in the Andean highlands even more extensively than it is today.

If La Paz is a peacock, the market place is its tail. Here the maids of the iridescent skirts hold court. The stalls occupy an entire square under cover, the overflow lining both sides of the street for blocks. I felt that I was attending a fancy dress ball and looked about for masks. Color ran riot. Seated on the ground, encircled in petticoats ranging in shade from scarlet, rose, and pink to purple, violet, and lavender, the Chola merchants displayed their wares spread

TYPES IN LA PAZ

out before them on colored blankets. Nothing was sold by weight. The produce or merchandise was arranged in the primitive way, in little heaps, on which a price was set. The people bought their supplies only for the one day. I followed a modest purchaser, who filled his basket with two cents' worth of *chuño* (the frozen potato, on its native heath), three cents' worth of *charque* (jerked beef), and four whole cents' worth of fruit.

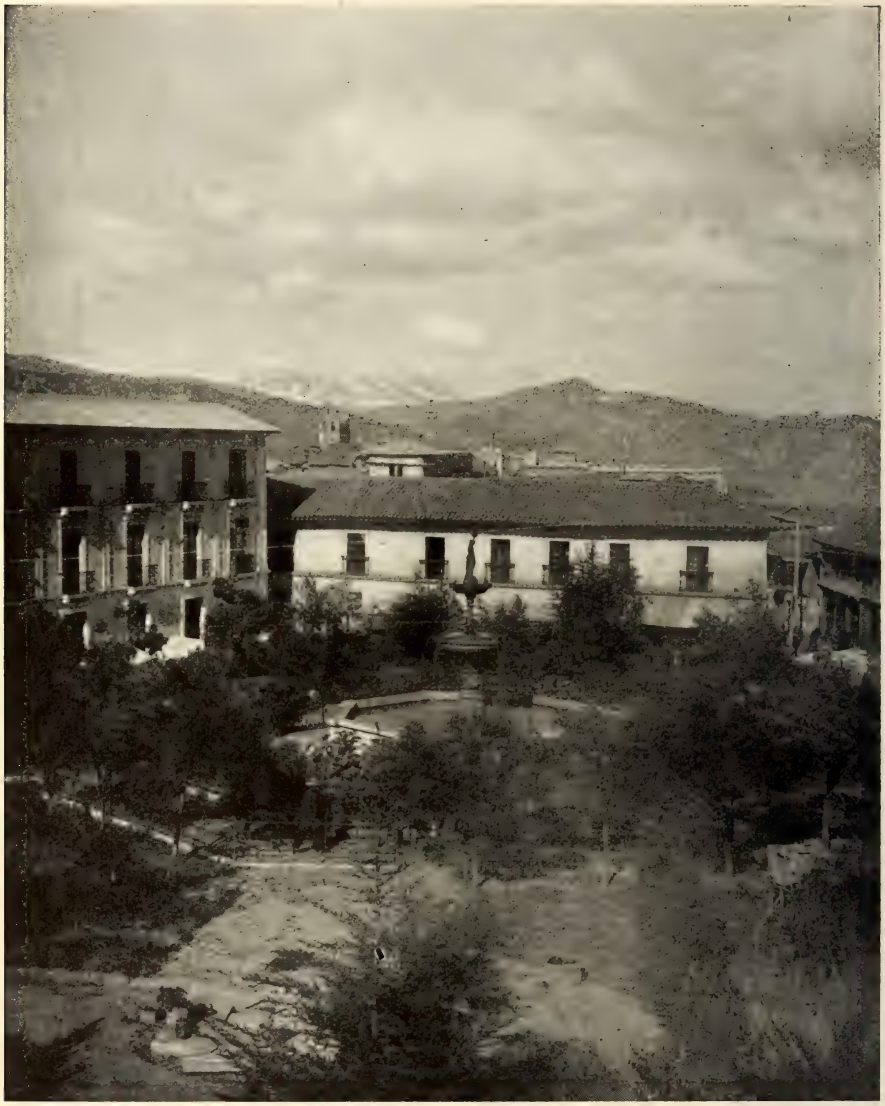
Although La Paz is situated upon the roof, its market is filled with every variety of fruit, vegetables, and flowers from the gardens of the Yungas, on the eastern slope of the Andes. Llamas and burros bring the produce to town, and on Sunday morning the country people may be seen coming on foot down the steep trails from the heights, urging on their tired animals. Their goal is the Sunday market, the eventful day of the week.

I went from one stall to another, learning much of the ways and needs of the people. A native café interested me. The chef, a little Cholo boy, squatted on the ground beside a brazier, watching a pot containing the favorite *chupe,* grandmother to the Irish stew. When the feast was ready there was a general scramble, fingers serving in place of spoons.

An Indian artist, hawking his wares, next claimed my attention. He sold his work by the yard, colored figures on a white background, and I have ever since been endeavoring to unravel his pictured story. It seems to be the portrayal of some oral tradition handed down from his forefathers.

From the artist I turned to a musician, a "Pan-come-true" playing on reed pipes. I wondered how this shepherd had managed to slip away from his flock of alpacas up on the cheerless mountain, and realized that this was a great day for him, a mad whirl of social pleasure. A saucy-faced little flower-seller seemed to be the princess of his dreams, for he piped his sweetest as he passed her booth.

The shepherd was not the only musi-



A PLAZA IN LA PAZ, SHOWING MOUNT ILLIMANI IN THE DISTANCE

cian in evidence, however. Along came a rival thumping on a guitar-like instrument constructed from the shell of the armadillo. This gallant held my attention only for a moment, for my notice was called to a solemn-faced little youngster, who evidently had an elastic stomach. He was stowing away enormous quantities of sugar-cane, while his big sister stood lost in admiration of a Chola merchant wearing a pea-green blouse, at least fifteen petticoats, and a pair of earrings three inches in length. The country damsel wore only one scant skirt and a ragged shawl, and her face, as she gazed on the dazzling Chola, expressed both envy and awe.

It was most interesting to me to see the Quichua and Aymará types side by side. They seldom blend in their native

TYPICAL INDIANS OF BOLIVIA

ON THE ROAD TO LA PAZ

highlands. The pure-blooded Indian fears and dislikes all whites and is not on intimate terms with the Cholos. He often understands Spanish, even when he can or will not speak it. On the highway he appears very respectful, greeting the stranger with a gutteral "Tata, asqui ura churutam" (Father, a good day to thee).

The shoe stall proved the market's "star" exhibit. Every possible combination of color was displayed in the footgear. On the street I saw men and women carefully carrying their shoes, saving them for the following "fiesta" day, when they squeezed their poor rock-worn feet into the gorgeous yellow creations decorated with pink, blue, and purple designs. After paying for any purchase the customer expects some little thing to boot from the merchant.

As we walked away from the market we came on a group of children playing a favorite game, which was not "hide and seek," but a mock bull fight. One child had horns tied on his head, and the other boys represented *toreadors*. Bright little fellows, these future Bolivian citizens. A day of progress has dawned for them. La Paz is now connected by rail with Chilian, as well as Peruvian, ports, and before long Bolivia will be traversed by a railroad connecting Peru and Chile with northern Argentina. In time the road will also be finished from La Paz to Puerto Pando, at the head of navigation on the Beni branch of the Madeira River, and the line constructed around the dreaded Madeira Falls, on the route to the Amazon.

There were few foreigners in the city at the time of our visit, but the number is increasing steadily, with the arrival of American engineers, German merchants, and British capitalists. The Bolivians of

PET FIGHTING COCK OF THE FAMILY: NEAR LA PAZ

the better class have long been people of charm and culture. Even in the days when every luxury was brought up from the sea on the backs of animals, requiring a journey of months' duration, the homes of refinement were filled with European treasures and the educated people kept in touch with the outside world.

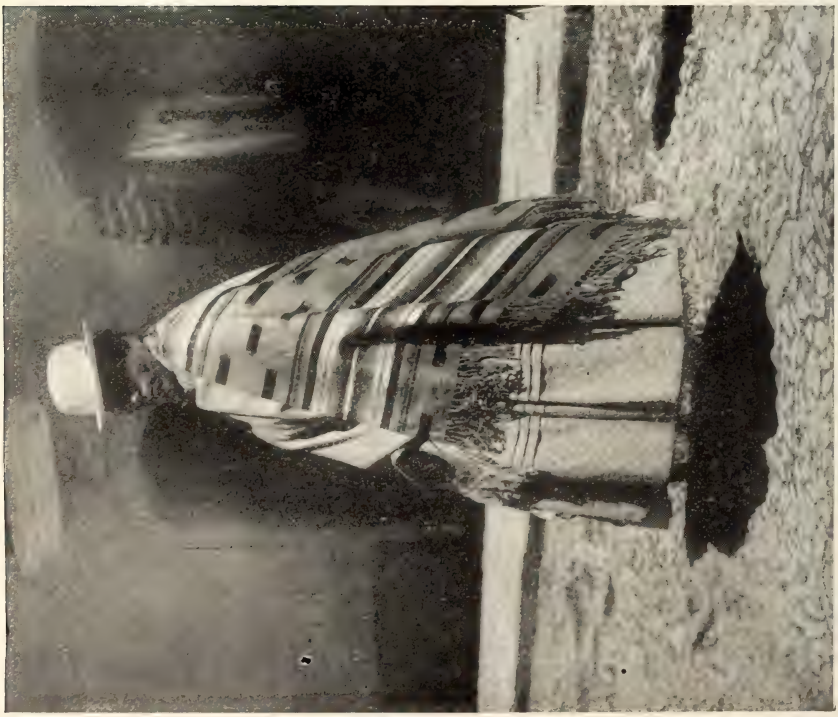
We visited all of the modern municipal buildings, and I was so selfish as to regret them. I dread the time when La Paz will lose her captivating individuality.

Through the city flows the Chuquiapu River, spanned by many bridges. It is a remarkable stream, inasmuch that it does not flow to the Pacific, as do most rivers formed on the western slope of the Andes. The Chuquiapu defies the natural order and flows through a cleft in the mountains, joining the streams bound for the Amazon.

One day we mounted mules and followed the merry little river. Our way led through steep, narrow streets to the Alameda, the city's park. By way of an avenue lined with stately trees we entered the suburbs and were soon out of sight of the town. The road now clung to the cliff and the canyon developed into a miniature Yellowstone in coloring. With each mile the mountain walls grew more rugged, more picturesque in their rainbow attire, and we very reluctantly turned townward. As we entered the city I looked back as the sunset glow enveloped the snow-clad Illimani, the mountain known to the Aymarás as "The Everlasting," guardian of the picturesque canyon of La Paz.

Although the Bolivian seat of government has never been moved officially from the city of Sucre, La Paz is in reality the capital. Far easier of access than the interior city, it is now the home

YOUTHFUL PONGOS ON THEIR FIRST VISIT TO TOWN
(SEE PAGE 124)



A CHOLA GIRL: LA PAZ

of the President and his Cabinet and the headquarters of the army. Before the Europeans came the city was known as Chuquiapu, which means "the place of gold" in the Aymará tongue, and upon the site of the ancient town "Nuestra Señora de La Paz" (Our Lady of the Peace) was founded by the Spaniards in 1545. After the final victory of independence, in 1824, the name was changed to "La Paz de Ayacucho" (the Peace of Ayacucho) in honor of the famous battle-ground.

There is a deep significance in this application of the name of Ayacucho, reverenced by all South Americans as the place where the Spaniards met their Waterloo, for La Paz can now claim both Alpha and Omega. It was in "Nuestra Señora de La Paz," in the year 1809, that the first cry for liberty was sounded in the Southern republics.

CHOLA GIRL IN PARK: LA PAZ

Remote from the seat of Spanish authority, the spirit of independence had been fostered in this country, then known as Alto, or Upper, Peru. Here the people had suffered most from the cruel *mita* and many other forms of tyranny. The first proclaimed Declaration of Independence ran: "In the noble and valorous city of Our Lady of the Peace, at 8 o'clock at night, on this 16th of July, 1809, assembled in the salon of the Cabildo, the undersigned, in the name of the people, declare and swear to defend with their blood and fortune the independence of the country."

It was in the Plaza Murillo, opposite our windows, that one of the great signers of this declaration was led to the scaffold the following year. Yet in the prophecy uttered in his farewell, "The torch which I have lighted shall never be extinguished," Pedro Domingo Murillo voiced a great truth. Recalling the twenty flags of the Latin-American republics, one realizes that he and his fellow-patriots did not die in vain.

To the traveler the interest and charm of a city like La Paz lies not only in its ever-changing scenes, for every street, every other building, has its history. I never entered the old court-yard of our hotel at twilight without picturing scenes quite as attractive and far richer than those of today. From the balconies above I seemed to see fair, bejeweled ladies, robed in satin brocade, with great tortoise-shell combs crowning their heads, looking down, as mounted cavaliers rode gaily into the patio, resplendent in armor, silver trappings on saddle and bridle. Those were indeed picturesque days, under the vice-royalty; and sometimes, in the very early morning, when the city was still asleep, I walked up the old highway leading to the heights. Failing to look back at the tiled roofs, I quite

GOING TO MARKET: LA PAZ

forgot the coming of the Spaniards, for the men and women whom I met on the road belonged to a time long past. Speaking a tongue even more ancient than the Quichua of the Incas, these people were little changed from their ancestors who lived in Aymará-land. In those olden days, when the habitation in the canyon was known as Chuquiapu, just such wayfarers as these urged their llamas down the steep hill at dawn, hoping to be the first of the country folk to reach the village market.

Too soon came the day for our departure. Regretfully we rode up to the Alto, where we stood for a time bidding "farewell" to the canyon. Yet I find I have never lost sight of it.

Up here in our progressive America, where we rush and strive from morning till night, where all of the cities are alike, and every man, woman, and child dresses like every other, I think happily of "Our Lady of the Peace." When the day is especially colorless I recall with delight that far-off canyon, where lies the quaint city of "high lights," kaleidoscopic La Paz.

CEMETERY IN LA PAZ

The Chola women in white are the mourners. Tombs are decorated with artificial wreaths of wax or porcelain

MONTE BLANCO, OVERLOOKING LA PAZ

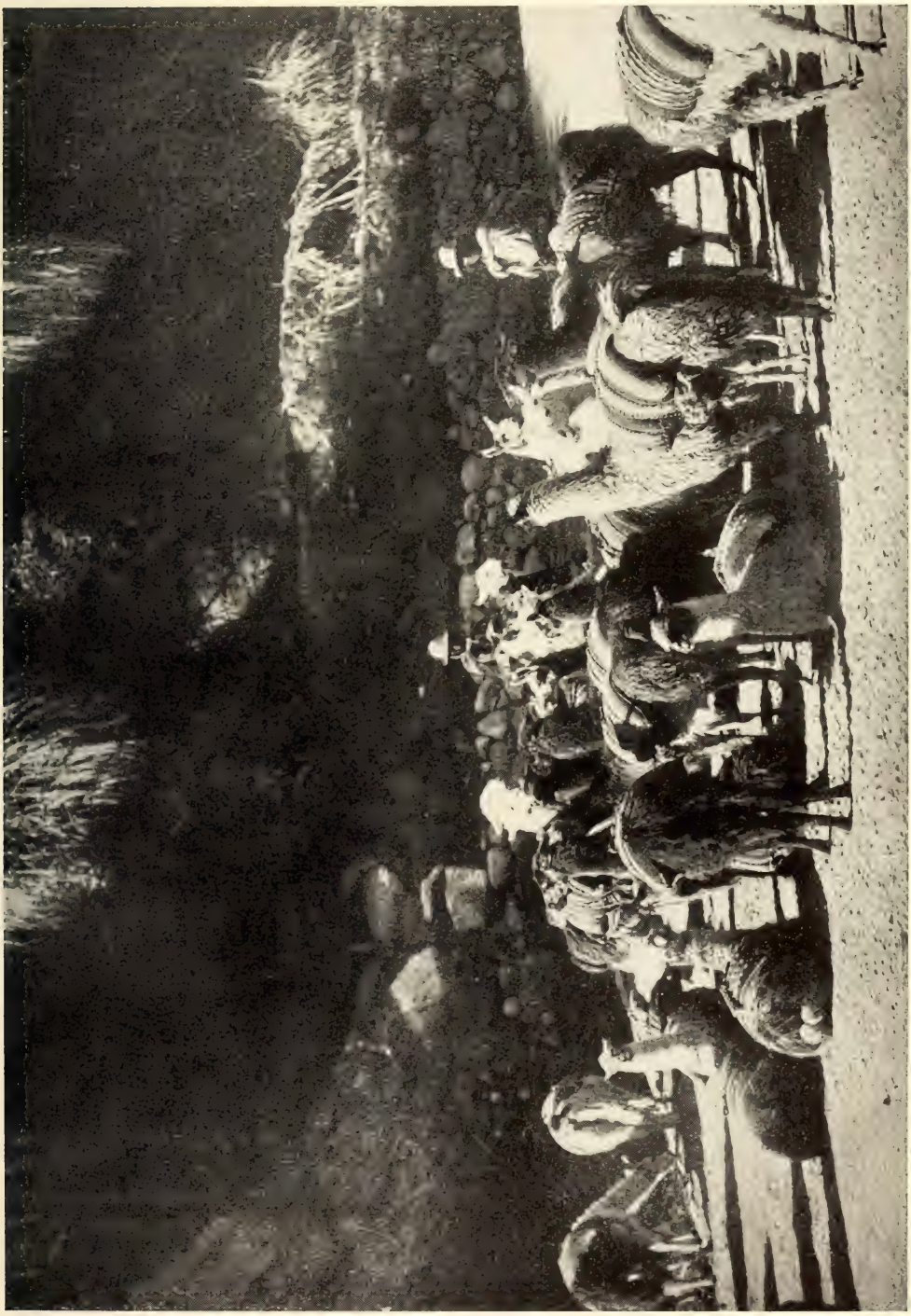
PLAZA SAN SEBASTIAN: LA PAZ

A HOLIDAY CROWD IN THE PLAZA SAN PEDRO: LA PAZ

MARKET SCENE: LA PAZ

La Paz is over 12,000 feet above the sea, but its market is filled with tropical fruits from the forest country on the eastern slope of the Andes

STREET SCENE: LA PAZ



LLAMAS: LA PAZ

THE MOUNTAINEERS OF THE EUPHRATES*

By Ellsworth Huntington

THREE thousand years ago the proud kings of Assyria led their trained armies northwestward into the mountainous region of the upper Euphrates and Tigris rivers. The turbulent mountaineers against whom they advanced fled before the civilized soldiers of the Mesopotamian plain and took refuge in inaccessible heights, leaving their rude villages of mud and stones to be destroyed.

Invariably the kings claimed to have defeated the wild upland tribes, as boastful inscriptions carved in the living rock still prove; but the defeat was never permanent. As soon as the soldiers retired the mountaineers reoccupied their villages, and soon began to plunder the lowlands as lawlessly as ever.

Centuries later, when Xenophon led his ten thousand Greeks from the lower Euphrates northward across the Armenian plateau to Trebizond, the mountaineers were still untamed. All night they rolled stones down the mountain-side upon Xenophon's army, and were only vanquished by a stratagem.

Today the great empires of Mesopotamia have fallen; the power of Greece has passed away; but still, as of old, the mountains breed lawlessness, and the mountaineers are the unsubdued scourge of the people of the plains.

The lineal descendants of the Carduchi who opposed the march of Xenophon are the Kurds—a sturdy, strong-featured race of Mohammedan Aryans, allied to the Persians on the one hand and to the Armenians on the other. Their home is in the southern part of the Armenian plateau, among the headwaters of the Euphrates and Tigris rivers, and in the Zagros Mountains, which run southeastward from Lake Van to the Persian Gulf and form the boundary between Turkey and Persia. There they tend their flocks; for the majority are primarily shepherds, although they cultivate the soil so far as possible.

Although most of the Kurds possess villages, composed of clusters of low, flat-roofed houses of stone or mud, all the tribes are more or less nomadic. The majority live in dark-brown, many-peaked tents of goats' hair during the summer, not wandering far from home, but merely going up into the high mountains, where it is too cold and snowy to dwell in winter.

A considerable number, however, live a purely nomadic life, wandering hundreds of miles along regular routes between the warm plains of Mesopotamia in winter and the cool, grassy uplands in summer. Among the pure nomads society is organized upon a half-tribal, half-patriarchal system, while the semi-nomadic Kurds are either divided into tribes or clans, like those of medieval Scotland, or are ruled by feudal lords, whose power is often absolute.

Poverty is the rule among the Kurds; their mountain fastnesses are difficult of access, and they themselves are strong and hardy by reason of their life of exertion. The people of the neighboring fertile lowlands, on the other hand, are relatively well-to-do, and are also comparatively unprotected and averse to war. All these factors combine to make the Kurds a race of plunderers. "No race," says the famous geographer Reclus, "neither Baluch, Bedouin, nor Apache, has developed the marauding instinct to a higher degree than have the warlike Kurd tribes."

One of the places where they are most lawless is Dersim, a highly mountainous district lying between the two main branches of the Euphrates River. For scores of years the Turkish authorities, like their ancient Assyrian predecessors, have been vainly trying to bring the Kuzzilbash Kurds of this region into subjection. Last summer a new opportunity seemed to offer itself. The rainfall of the winter of 1907-08 was unpropitious, and the Kurds succeeded in raising

* This is the first of several articles by Mr Huntington describing little known regions of Asia which will be published in the National Geographic Magazine during 1909.

only very scanty crops from their sterile mountain-sides and narrow valley bottoms. It was necessary to procure food from more prosperous places. A few began to plunder their neighbors; the majority attempted to buy food in a legitimate way.

The government heard that a large caravan loaded with grain which the Kurds had purchased was on the way to Dersim. "Now," said the officials, "is our chance to deal the Kurds a telling blow without danger to ourselves." Troops were ordered to seize the caravan. When the Kurds heard that the grain on which their wives and children must rely for sustenance was lost to them, there was a fierce uprising on all sides. The government ordered troops into the mountains, but at first the soldiers would not go. They were only half paid and half clothed. Why should they risk their lives in a wild region, where the enemy hid behind rocks high on the mountain-sides and never gave the invaders a chance to shoot them. Ultimately some 30,000 troops are said to have been sent to the confines of Dersim. There was more or less fighting, a number of men were killed on both sides, and some of the Kurdish leaders were imprisoned.

The Kurds have been punished, but not conquered: they will probably remain quiet only until they become hungry once more. Like those other scourges of Turkey, the Albanians in the Balkans and the Arabs in the Syrian desert, they cannot be made to keep the peace permanently unless some economic change can be introduced to prevent them from suffering when their parched hillsides fail to furnish an adequate supply of food.

The southern part of the Armenian plateau, where many of the most warlike Kurds dwell, furnishes an admirable example of the influence exerted upon man by inhospitable mountains among which lie fertile plains. The plateau is highly diversified. Above its uneven surface rise lofty ranges of limestone mountains and scores of great volcanoes, such as Nimrud and Sipan, near Lake Van, so recently extinct that hot springs still abound in the craters and elsewhere. Below the general level of the plateau magnificent canyons have been cut by the Euphrates and Tigris rivers and their tributaries, while broad basin-shaped depressions are floored with smooth, fertile plains.

Originally the whole country was probably occupied by the Carduchi, the ancestors of the Kurds. Over two thousand years ago, however, the Kurds gave way before Armenian conquerors, who, in turn, submitted to Turkish invaders in more recent times. The result of these invasions, on the one hand, and of the diverse topography of the country on the other, is seen today in the distribution and character of the three races—Kurds, Armenians, and Turks—who now occupy the region of the upper Euphrates. The Kurds, being the conquered race, hold the mountains and some of the less accessible valleys and basins. Like many races which have been driven to the highlands by strong invaders, they are now the terror of their conquerors.

The Armenians occupy a position intermediate between the Kurds and the Turks. Sometimes they live in the heart of the mountains and are of a decidedly warlike character. Often they occupy somewhat secluded basins or valleys, girt by lofty hills, and in many cases they possess large portions of the most fertile plains. The Turks, as befits the most recent conquerors, are generally confined to the richest plains and to the cities. The areas occupied by the three races are not marked off distinctly. In some cases Kurds, Turks, and Armenians all live close together. In the cities each race often has its own quarter; but it is very rare to find all three in the same village. Armenians and Turks, however, often occupy different quarters of a single village. Nevertheless, on the whole, the three races live apart, each having its distinct habitat.

The Kurds, Armenians, and Turks have little love for one another. The Kurd hates the Turks because they have often worsted him in battle, because they tax him heavily whenever they are able,

and because they curtail his opportunities for fighting and plundering. He despises the Armenians because they are Christians, and because they can be robbed and ill-treated almost with impunity when the Turks give permission. Yet in spite of this he has a sort of sympathy for them, because they, too, are oppressed.

The Armenian hates and fears both the Kurds, who plunder him, and the Turks, who oppress and persecute him. He also despises both races because they are not so clever as he. It is only by exerting his superior wits in business or in flattery of his rulers that he can manage to maintain his position. It is not strange that his character reflects the conditions under which he lives.

The Turk, in turn, despises the Kurds because many of them are very half-hearted or heretical Mohammedans, and because they are simple, unsophisticated folk. He fears them, also, because they are wild, lawless people, who make the life of the tax-gatherer a burden and who rob a Turkish official with great glee if they find the opportunity. The Turk despises the Armenians because, as he would somewhat unfairly put it, "they are cowardly Christian dogs." He hates them because he knows that they are far quicker and keener than he, far better business men, and far better educated.

The Turks realize their own mental and industrial inferiority to the subject race, and they realize, too, that the Armenians owe much of their present advancement in education and industry to American missionaries. The common feeling among the Turks prior to the recent revolutionary crisis is well illustrated by a saying which was common among them two or three years after the sad massacres which were perpetrated upon the Armenians in 1894-96 by the Kurds, with the consent of the Turks. "A few years ago," said the Turks, "these Christian infidels were stripped of everything. Now," as the Turkish idiom puts it, "they eat better than we do. What shall we do about it?"

Racially the Turk in the upper Euphrates region has little reason to despise either the Kurds or the Armenians. Two out of three of his ancestors probably belonged to one race or the other. Not only are Kurdish and Armenian women frequently taken to Turkish harems by force or otherwise, but there is a constant process of assimilation going on. When a Kurd comes from the mountains to work in the city or in a large village, he forms the habit of speaking Turkish instead of his own semi-Persian tongue. Little by little he gives up Kurdish ways of thought and action and passes himself off as a Turk, especially if he begins to rise in the social scale. All over the country villages can be found which are properly Kurdish, but are situated among Turkish villages and are gradually becoming assimilated to their neighbors. Other villages can be found which are now considered Turkish, but which have distinct traditions of a time when all their inhabitants were Christian Armenians. They were converted by force during some period of persecution and now intermarry with the true Turks, and are zealous Mohammedans.

A good example of the transition from Armenians to "Turks" is found in the small mountain-girt basin of Bermaz, south of the city of Harput. The villagers are known as Kurds at home, but as Turks when they go abroad. According to reliable Armenian sheep dealers who have most intimate dealings with them, the people of Bermaz make the sign of the cross before meals and have a common tradition that their ancestors were Armenian Christians a few centuries ago.

Religious edifices of any kind are rare in these villages, although prayers are said according to the common Mohammedan practice. Apparently the process of becoming "Turks" is only half completed. In a few hundred years more such villages will probably claim to be purely Turkish.

The mixture of religious ideas among the more remote inhabitants of the upper Euphrates region is singular. Dersim, the region already referred to, between the two main branches of the Euphrates,

Photos by Ellsworth Huntington

AN ARMENIAN FAMILY, CONSISTING OF A FATHER, SON, MOTHER, AND SERVANT, IN ORDER FROM LEFT TO RIGHT

The long sleeves of the undergarment are arranged in four different ways. In winter they are used in place of gloves. The stone pestle and the gourds for water are common in remote districts.

A GROUP OF ARMENIANS READY FOR DINNER

Their costume displays the extent to which they have been influenced by the west. Some wear tunics, others are clad in baggy Turkish trousers, and one has adopted tight European trousers, and therefore finds it inconvenient to sit on his knees or cross-legged as the others do.

Photo by Ellsworth Huntington

A PORTION OF THE CITY OF HARPUT

It lies around a strong castle 1,500 to 2,000 feet above one of the broad, fertile basin-plains of Armenia. The large roofless building on the right is an Armenian church, which was burned by the Kurds during the massacres of 1905.

is inhabited largely by Kuzzilbash Kurds who are neither good Mohammedans, good Christians, nor good pagans. Nominally they belong to the Shiah sect of Mohammedans, who are looked upon with great aversion by oxthodox Sunni Mohammedans, such as the Turks. In practice the Kuzzilbash are very cosmopolitan in their religious observances. When away from home they readily join in the prayers at either a Shiah or a Sunni mosque. If they happen to be in an Armenian village where there are no Turks, they often go in and join in the Christian service, kneeling and bowing with the congregation. At home they are said not to pray except when led by one of their sayids, or holy men, who are supposed to be descendants of Mohammed. As a matter of fact they, like the rest of the Kuzzilbash, are probably descended, in part at least, from Armenians whose conversion to Mohammedanism was not exactly a matter of conviction.

One of the most peculiar customs of the Kuzzilbash is an ancient rite which is apparently of Christian origin. No European has seen it, but, according to trustworthy Armenians, the Kuzzilbash men gather at the mosques on solemn feast days and one by one they advance to the front of the sacred building—on their knees, it is said by some. As each man comes forward a sayid takes a bit of meat, dips it in wine, and puts it in the man's mouth. Such a ceremony can scarcely be anything but a relic of Christianity.

In many places Turks, Kurds, and Armenians all reverence the same shrines—places which have probably been sacred since the far-off days of the pagans who fought with the Assyrians or opposed the march of Xenophon. One of the most notable of such places is located in Mushar Dagh, or Mushar Mountain, inside the point of a sharp bend to the westward made by the Euphrates River

Photo by Ellsworth Huntington

AN ISLAND CASTLE IN THE EUPHRATES RIVER NEAR THE MOUTH OF THE CANYON

The stairways, platforms, and tunnels on this rock and on the fortified cliffs on either side of the river were carved by the Haldis, one of the old races of mountaineers who fought with the Assyrians. The fortifications must have been constructed to guard against enemies coming down the river, probably on rafts of skins such as are represented upon Assyrian monuments and are still in use.

around the Harput Mountains near Malatia.

Close to the river lies a great rock, fashioned by an ancient race called Haldis into a castle whose main feature was innumerable platforms, steps, cisterns, and tunnels carved in the solid limestone. Four hundred feet up the bare brown side of the mountains a rude platform of mud and stones is said to be the grave of a saintly Armenian girl who cared for a ruined church which lies two thousand feet higher, at the very peak of the mountain. Beside the grave stands a scraggly thorn-bush decked with a multitude of fluttering rags of every hue.

As the writer stopped beside it his Armenian guide lifted the cotton robe which hung half way to his ankles, and from the bottom tore a strip of cloth. This he tied to the bush. "What is that for?" I asked. "Are you sick?" "No," was the answer, "I am not sick, but I may have a pain some day, and this will drive it away." He went on to explain that the grave was extremely holy, and that the sainted girl had great power to heal diseases. The Kurds of the neighboring village evidently are of the same opinion, for they tie rags to the bush, and their chiefs are brought here for burial, altho the common people must be content with a final resting-place down by the river.

Five or six hundred feet above the resting-place of the Armenian girl, a limestone cave contains a grave reputed to be that of a Mohammedan saint called Hassan. The supposed grave is of enormous size, and is covered by a great mass of dry clay adorned with velvet and tinsel brought by pious worshipers. The back of the cave is partially walled off from the

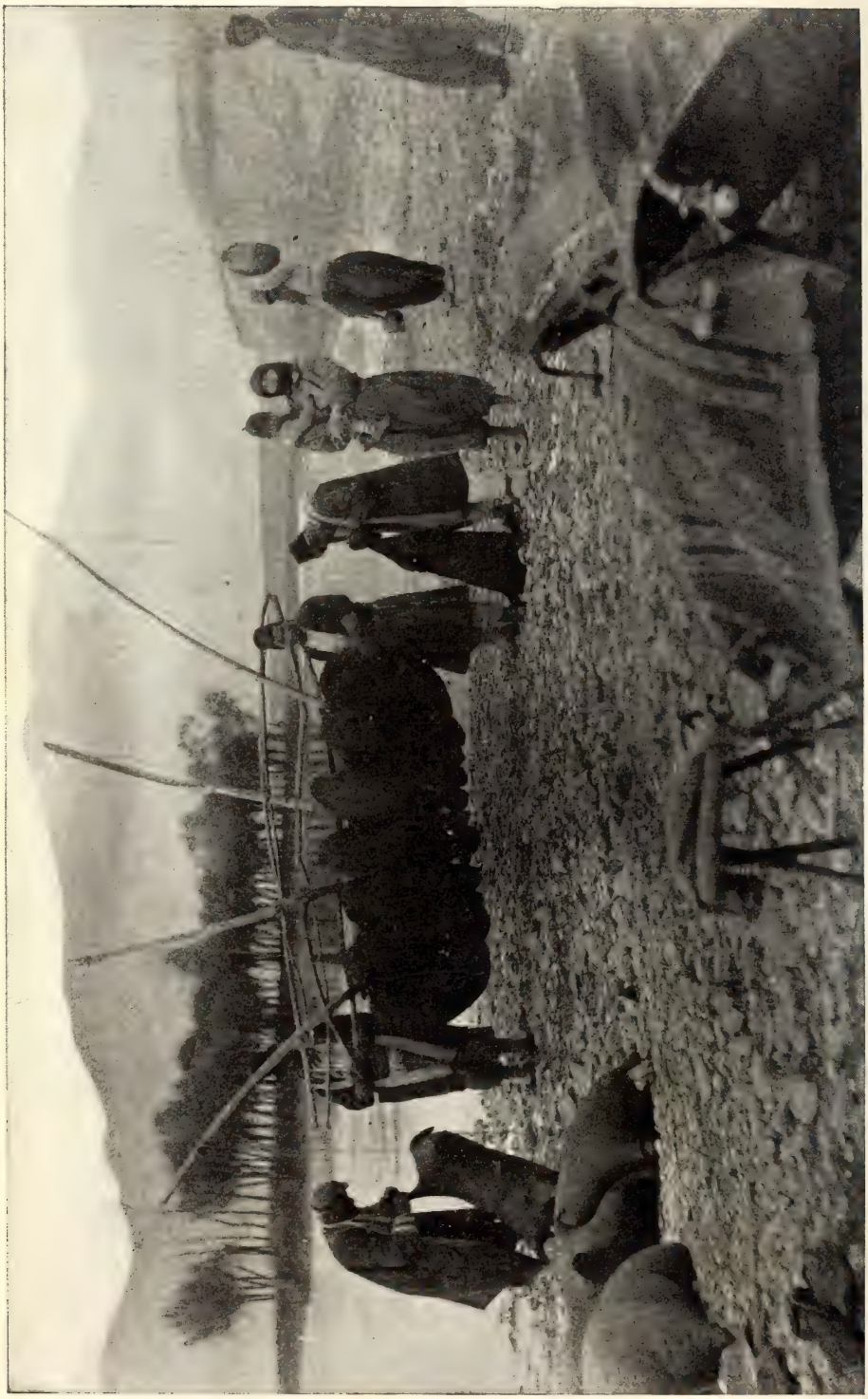


Photo by Ellsworth Huntington

ARMENIANS CONSTRUCTING A RAFT OF INFLATED SHEEPSKINS ON THE BANKS OF THE EUPHRATES RIVER

The partially finished raft has been lifted up in order to show its construction. The woman on the right is carrying drinking water from the river. She scoops it up with the gourd in her right hand

Photo by Ellsworth Huntington

A COMPLETED RAFT OF INFLATED SHEEPSKINS

portion which contains the grave, and there, in a recess, all manner of filthiness is gathered—the bones, sinews, and gristle of sacrifices which pilgrims have devoured beside the grave. Outside the cave the place of sacrifice appears—a great altar, four-square, of rough stones, covered with the dark gore of countless victims offered through the ages by Turks, Kurds, and Armenians, all of whom hold the spot in equal reverence. Beside the main altar stands a smaller one piled high with the horns of sacrifices. Great beams have been put up between this altar and a neighboring rock, and from them hang large copper caldrons, donated by pilgrims for the use of the offerers of sacrifices. No man dare touch the sacred objects except for their legitimate uses, and the caldrons and the offerings of tinsel and cloth within the cave remain unmolested in a region where all things else are constantly subject to theft.

The crowning holy place in this bend of the Euphrates is the ruined church of Mushar Killisseh, or Surp Aharon (Saint Aaron), as the Armenians call it, on the top of the mountain, 2400 feet above the river. The men who built it must have had great love of scenery or else a great desire for safety or seclusion. Otherwise the church would scarcely have been built in so inaccessible a spot, unless, perchance, the site was originally chosen as a holy place by worshipers of the sun. The chief interest of the shrines of Mushar Dagh lies in the fact that they indicate how closely the various and apparently diverse races of the upper Euphrates region are actually united to one another. In spite of conquest and racial difference, in spite of the diversity of life occasioned by the contrast between the fertile plains and the barren mountains, all races still reverence the shrines of their remote predecessors.

Photo by Ellsworth Huntington

MARBLE GORGE OF THE EUPHRATES NEAR KEBAN MAADEN

In ancient times marble was quarried on the right of the river and was apparently floated down stream on rafts

The customs, manner of life, and mode of thought of the Turks and Armenians are fairly well known; but those of the Kurds have been studied comparatively little. A few examples will give an idea of certain of the most noteworthy Kurdish characteristics. In the spring of 1901 the writer, in company with Professor Thomas H. Norton, U. S. Consul at Harput, was able to make a trip of two hundred miles down the Euphrates River through the great series of canyons by which the river traverses the Taurus Mountains. Only once before had the journey been made—by the great German general, Von Moltke, in 1838.

The raft was made of sheep skins, taken off entire and inflated with air. Thirty such skins, like great bladders, were tied under a frame of poles, and made a wonderfully buoyant raft. Rapids abound and our Armenian raftsmen feared to shoot them. Accordingly, at first we made arduous portages around rapid after rapid, climbing far up the steep walls of the canyon and descending over the rockiest of trails.

At length the canyon became so narrow that it was impossible longer to scale the sides, and we were obliged to shoot rapids much larger than those around which we had wearily climbed. Time

Photo by Ellsworth Huntington

ENTRANCE TO THE MAIN GORGE OF THE EUPHRATES

after time we were drenched in great waves which broke over us at the foot of smooth-sloping sheets of water, where the raft seemed to drop like a toboggan. Once one of the men was washed overboard by a wave, but was caught by his companion, who seized the skirt of his gown as he disappeared. Once the raft struck upon rocks in the midst of a wild rapid, but fortunately it held together and we came through safely.

On this journey down the Euphrates, our first contact with the Kurds was at a ferry. As we glided toward the ferry the Armenian raftsmen said: "Do you see that boat? It belongs to the village next above ours. Last winter the old boat belonging to the Kurds was carried away in a flood. As soon as the water fell they came up to our neighbors' village and carried off their boat. And what could the poor Armenians do? They have no guns. The Turks have taken them all away."

As we floated toward the Kurds we approached the shore, and finally stopped close to them. "Backsheesh! Backsheesh! A present," was their greeting. "This is our ferry, and you must pay us." It made no difference to them that, as we pointed out, we were using our own conveyance, and were going down the river,

Photo by Ellsworth Huntington

TURKISH SOLDIERS CROSSING THE MUZUR SU, A BRANCH OF THE EUPHRATES RIVER, BY MEANS OF A SMALL RAFT OF SKINS, TOWED BY A FRIGHTENED HORSE

not across it. They took out their long flint-lock guns and prepared to shoot. It was only when we emphasized the fact that our party contained a consul that they let us go without payment and without gunshot.

Later we came to an isolated crag of naked rock rising close to the river and crowned by the ruins of an ancient castle, used first by the Haldis, then by the Romans, and finally by the Saracens. At its foot lay the ruined mosques of Pertag, a town which was moved to another location nearly a hundred years ago because soldiers were quartered on the inhabitants for half a year at a time.

Some months later I visited the new town—a picturesque place at the foot of hot, white, limestone mountains, from which gush out springs of clear, cold water to support the trees and vines that embower the flat-roofed adobe houses. As my companion and I were sitting under the ever-present mulberry trees, enjoying a watermelon with yellow flesh and brown seeds, a ragged man, hot, breathless, and exhausted, came running up to the house where twenty soldiers were quartered to preserve the peace. At once there arose the sound of shouting; horses were led out; soldiers were seen taking down their guns and ammunition; the villagers came out of their houses or in from the fields in wild excitement, loading their long guns as they walked. Some of the soldiers and villagers went in one direction, some in the other. It appeared that three or four hundred sheep and goats belonging to the village had been grazing, an hour's journey away, when a band of Kuzzilbash Kurds swooped down upon them. One shepherd was shot; the others ran away. Now the whole village was going out in an attempt to overtake and punish the robbers. How it turned out I do not know,

Photo by Ellsworth Huntington

A KURD SWIMMING ACROSS THE EUPHRATES ON AN INFLATED GOATSKIN

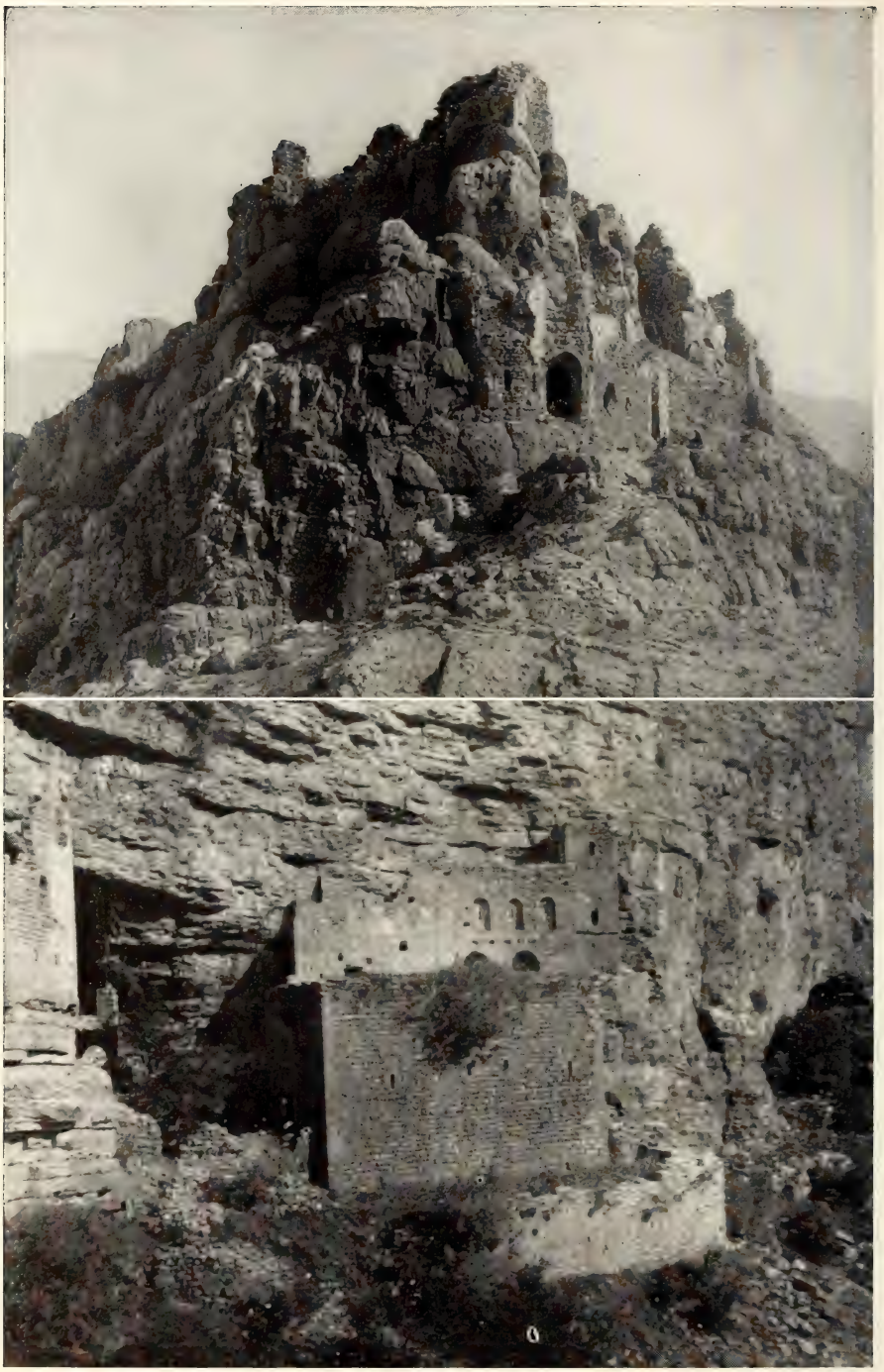
for we were obliged to continue our journey. The government was so afraid that some harm would befall the foreigners of our party that it insisted upon increasing our escort for the next few days to four, then seven, and finally sixteen soldiers.

After spending seven days in voyaging down the Euphrates we landed at the picturesque castle of Gerger, on a peak among the foothills which overlook the great plains of Mesopotamia. There we stayed a few days in a village occupied partly by Kurds and partly by Armenians.

One day I went out to copy a long Greek inscription dating from about the time of Christ. Some twenty swarthy Kurds in white cotton drawers, white shirts, and gaily embroidered waistcoats followed me. As I copied the old Greek words, they leaned on their long guns and talked in low tones, until at length they seemed to come to some decision, whereupon they all went quietly away. Then I heard the sound of gunshot after gunshot, coming apparently from the gate of the castle.

When I went out, the graceful Arabic inscription over the door was seen to have been freshly chipped and defaced. Evidently the Kurds had been firing at it. Back at the village the servants explained the matter as they had heard it from the Kurds. The Kurds, it appears, believe that all inscriptions tell where gold is buried. As they watched the foreigner copy the Greek inscription they said to one another: "We can't stop him now; he has copied this one and will find the gold. Let's go outside and spoil the inscription over the door, so that he shan't find that gold, too."

That night I made minute inquiries



Photos by Ellsworth Huntington

THE CASTLE OF GERGER, OCCUPIED SUCCESSIVELY BY HITTITES, ROMANS, AND SARACENS

The size may be judged from the figure in the doorway

SYRIAN MONASTERY PLASTERED AGAINST THE WALL OF THE CANYON OF THE EUPHRATES RIVER

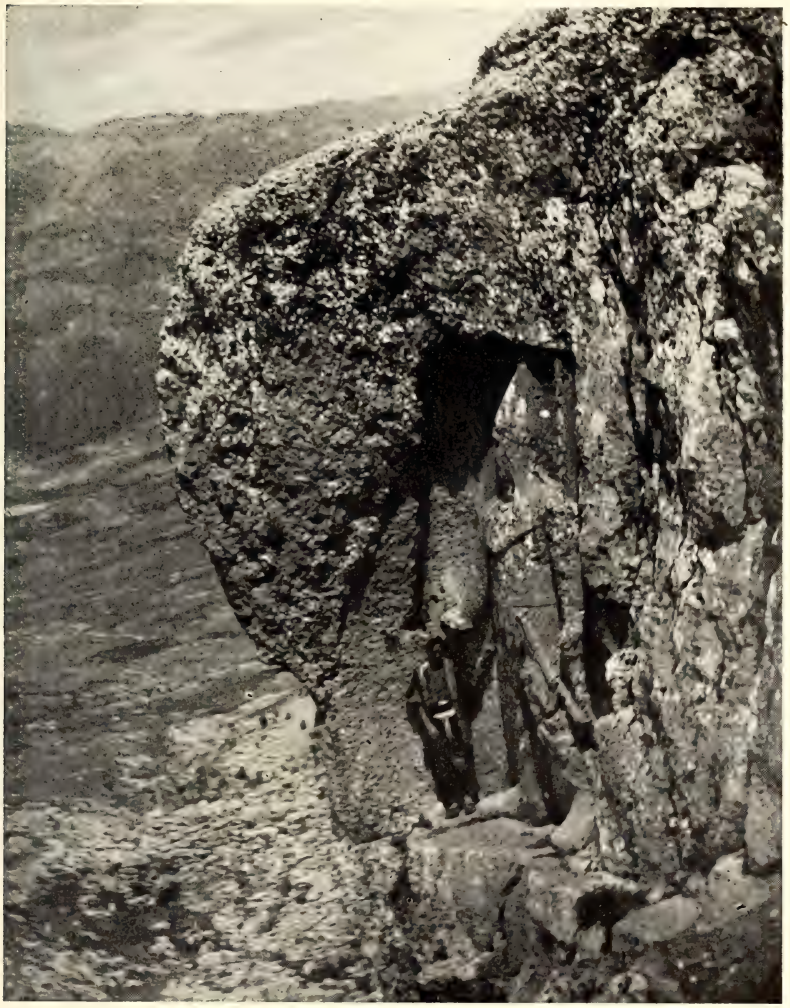


Photo by Ellsworth Huntington

HITTITE FIGURE CARVED IN SOLID LIMESTONE AT GERGER CASTLE

concerning a square cave which had been excavated thousands of years ago in the face of a perpendicular cliff of limestone on one side of the castle. Were there any inscriptions in it, or any rock carvings? The natives did not know. The next day I went down the river a few miles to an old Syrian monastery, plastered like a swallow's nest against the middle of the wall of the Euphrates canyon, here only some four hundred feet deep, but very narrow. In the wall of the monastery was a Syriac inscription upon a large stone imbedded in the wall about six feet below the roof. The only way to copy it was to let oneself down by a rope over the side of the building. As I sat in a bight of rope, dangling in space, the guides on the roof cried out, "Look, look, down there in the river." I looked, and there, far down below us in the yellow, muddy water, was the body of a man floating rapidly along. When I was pulled back to the roof, I inquired what sort of man he was. The guides only shrugged their

shoulders and said: "I suppose the Kurds up the river killed him and threw him in. Perhaps they robbed him. They often do that sort of thing."

In the village that night the servants remarked: "Do you know what the Kurds did while you were gone? They said, 'The foreigner can't fool us. He asked about that cave because he had read in the inscription that the treasure is buried there.' So they got a rope and let one of their number down. He pawed around in the dirt and at last was pulled up, and said that there was nothing there. 'You're a liar,' said the others. A second man was let down and brought the same report. A third had to be let down before the Kurds believed that there was no money in the cave."

The Kurds are full of strange ideas as to ruins. One day the conversation touched upon the hardness of the mortar in a certain ancient wall. "Do you know why it's so hard?" said one. "I'll tell you. This castle was built by a great king, who had an enormous flock of hens. When he was building the castle he had a huge trough built. Every night he gathered the eggs from twenty thousand hens and put them in the trough. The next day his men broke up the eggs and used them to make mortar. That's why the walls are so strong."

Credulous, fierce, and untractable as the Kurds are, they are nevertheless a people of true strength of character. Today they are a menace to the development of constitutional government in Turkey. They themselves are ruled partly by the patriarchal system, partly by the clan system, and partly by the feudal system, and all have had bitter experience of the hated rule of a despotic monarchy. Now they are suddenly given an opportunity to live under constitutional government. Little they care for that; but if they once understood it they would probably be among its staunchest supporters. For three thousand years they have lived the same wild, simple life, remote from all men and at strife with all men. Now, by no act of their own, modern ideas are coming to them. It is hard to foretell whether the recent changes in the government of Turkey will have any effect upon them, or whether they will continue to be influenced only by the mountains and the hard conditions of their immediate environment.

ONE THOUSAND MILES OF RAILWAY BUILT FOR PILGRIMS AND NOT FOR DIVIDENDS*

By Colonel F. R. Maunsell

THE Damascus to Mecca Railway has many remarkable features which distinguish it from other lines. Its principal object is to provide a means for faithful Moslems to perform their pilgrimage to the holy places of Mecca and Medina with a greater degree of comfort than formerly.†

Its inception is due to the initiative of the present Sultan, and the enthusiasm created by its first announcement brought in subscriptions from the faithful in all parts of the Islamic world. A special stamp-tax forms a solid annual contribution to the expenses, somewhat less evanescent than other contributions may prove to be.

Geographically, the line has provided

* Abstracted from the Geographical Journal of London.

† There are still many of the more rigidly orthodox who prefer the long, tedious journey by camel, with its fifty-two stages from Damascus to Medina, and count the hardships involved as part of the duty of pilgrimage.

DEPARTURE OF THE HOLY CARPET FROM DAMASCUS

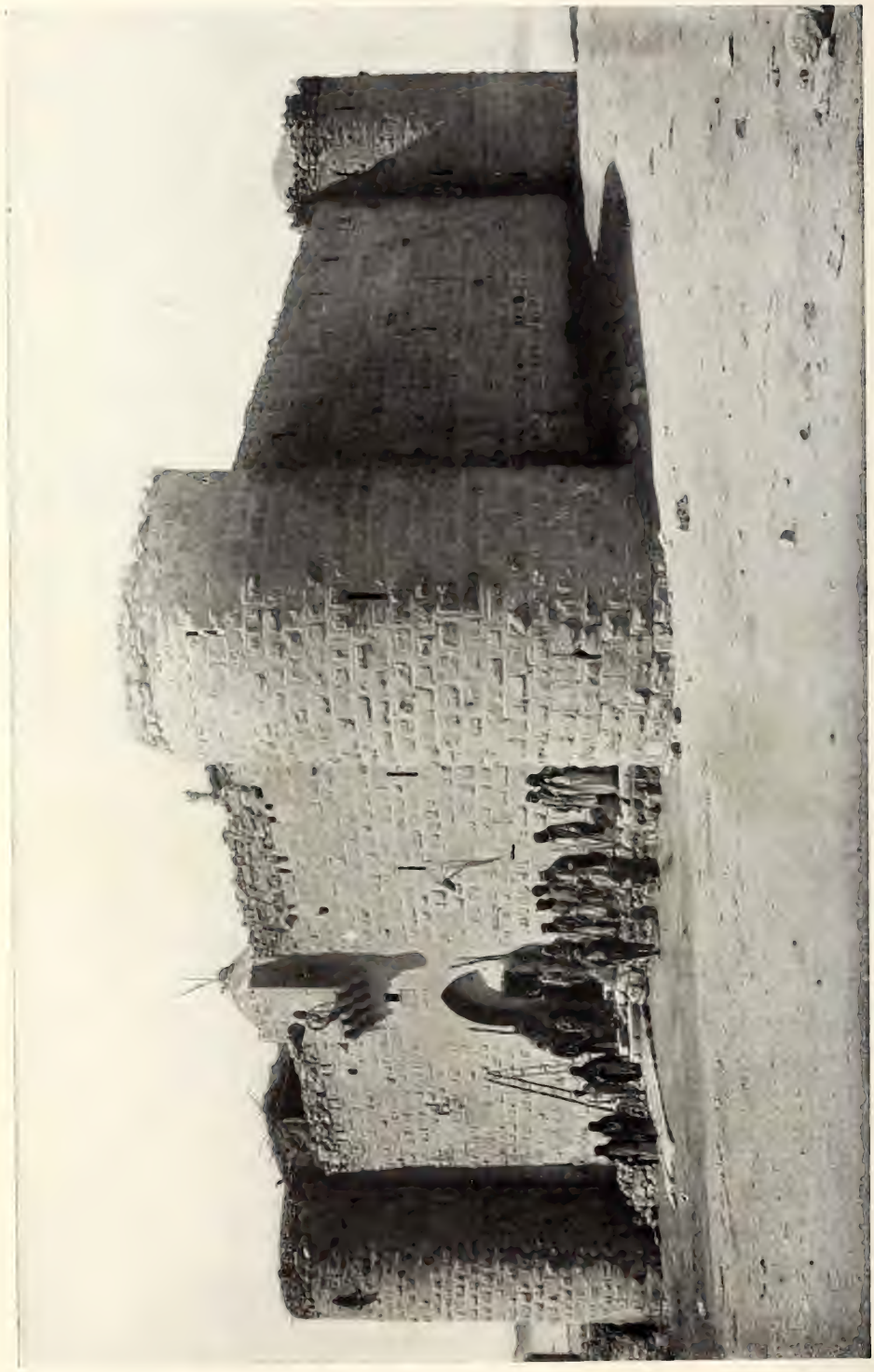
ENGINE "ABDUL HAMID" ON THE MECCA RAILROAD

Note the star and crescent, the national emblem of the Ottoman Empire

CELEBRATING THE DEPARTURE OF THE FIRST TRAIN LEAVING DAMASCUS FOR MEDINA

A CITY IN THE DESERT: MAAN (SEE PAGE 163)

A VIEW OF TEBUK, ONE OF THE PRINCIPAL TOWNS ALONG THE ROUTE OF THE MECCA RAILWAY (SEE PAGE 164)



A TYPICAL FORT IN ARABIA ALONG THE CARAVAN ROUTE TO MECCA
Inside these forts the pilgrims bound for Mecca found shelter at night

a means of travel in a country with a fascination of scenery quite peculiar to itself and unlike any other part of the world. Instead of traversing populous countries and great cities, it seems to delight in passing through immense solitudes—through a country peopled mainly by the spirits of the Arabian Nights, where little surprise would be occasioned in finding a roc's egg in some inhospitable, rocky valley, or in seeing a genie floating in a stream of thin vapor out of a magic bottle.

The line commences at the traditional parting-place of the great pilgrimage, the Bawaubet Allah, or Gate of Allah, in Damascus. For the first few miles the line traverses the Hauran, running parallel to the French Hauran Railway. From ancient times this district has been an extremely rich one, and the Romans used it as a granary.

The deep, narrow ravines of the Yarmuk, the ancient Hieroymax, which the line follows in its descent to the Jordan, present several difficulties of engineering successfully overcome. Large numbers of Italian, Montenegrin, Croatian, Greek, and other European workmen had to be employed on the difficult rock cuttings, tunnels, and viaducts of this section.

The Jordan Valley, where the line crosses it, is 800 feet below Mediterranean level; but the difficulties of construction cease when the Yarmuk Valley has been successfully traversed, and the ascent to the sea is made by easy gradients.

South of Deraa the main line soon leaves the richer corn land and enters an upland, undulating country, the land of Bashan, producing abundant grazing in the spring. At that season troops of gazelle roam about the country, and the Bedouin, with vast herds of camels, are found close to the line.

The landscape gets bleaker as the train moves south. The mountains of Moab are passed some distance to the west, and the trace is laid far out in the desert, where the valleys are wide and easy to cross, and before they deepen into narrow ravines as they enter the mountains.

The old pilgrim route is followed very closely throughout, and at the stations the stone cisterns and reservoirs, to provide a supply of water to the pilgrims, are noticed. Water becomes very scarce; in a few places wells have been dug and water is raised by wind-pumps. For some reason boring for artesian wells does not seem to have been tried. One attempt was made in rocky ground, and when the drills broke no further attempts were made.

As the line approaches Maan an extremely desolate country is traversed. Low ranges appear to the east, apparently of sandstone or limestone formation, although the ground is strewn thickly with black fragments of obsidian along some sections of the line. The ravines now trend eastward, to lose themselves in a wide depression in that direction, as shown in the recent maps of this country by Prof. Alois Musil. Maan is the first point since Amman where water is procurable in any quantity, either from springs in the small town itself or from wells at the railway station. The place is a large railway center, with several stone buildings for officials, a small shop for temporary repairs, a hospital, and quite a good hotel—a substantial building, rather small in size. The small town, containing some good stone and mud houses, is not visible from the railway, but lies beyond a hill nearly a mile off. Two copious springs supply the necessary water.

Date palms are reared; small gardens with various kinds of fruit trees and a few fields of corn are visible, but from a little distance the place is little else than a drab patch on a gray landscape. Its principal distinction is its proximity to the rocky city of Petra,* a ride of some eight hours to the west among the Moab hills. The climate of Maan is invigorating, both in winter and summer, as the place stands 3,525 feet above sea-level, surrounded by the dry, invigorating air of the desert.

The principal drawbacks are the severe

* For a description of this wonderful rock city see NAT. GEOG. MAG., May, 1907.

dust-storms. Rain is not uncommon in the spring, and then a tinge of green spreads over the landscape. The ancient fortress of Petra and now Maan owe their importance as standing at the gate of Arabia, and forming the last outpost of Syria and Western civilization before the long, dreary stages of the northern Arabian journey.

For countless ages—long before the present pilgrimages—this was the route by which the gold, frankincense, and Arabian products found their way into Syria; but the Suez Canal and steamer transport by the Red Sea seem to have abolished all, or almost all, trade prospects, and only the pilgrims remain.

On leaving Maan it may indeed be said that all hope of dividend is left behind, and the line enters a spirit world without towns or even inhabitants. The stages south of Maan, the old pilgrim route, were the most desolate of all, and the way was always strewn by dead and dying camels as the caravan toiled along. The line crosses a constant succession of small wadis.

Some 50 miles south of Maan comes the most remarkable change in the landscape, and the veritable gate of Arabia and the home of the genie is at last reached. The line arrives quite suddenly at the edge of the curious escarpment known as the Batn-el-Ghrul, or the Hollow of the Genie.

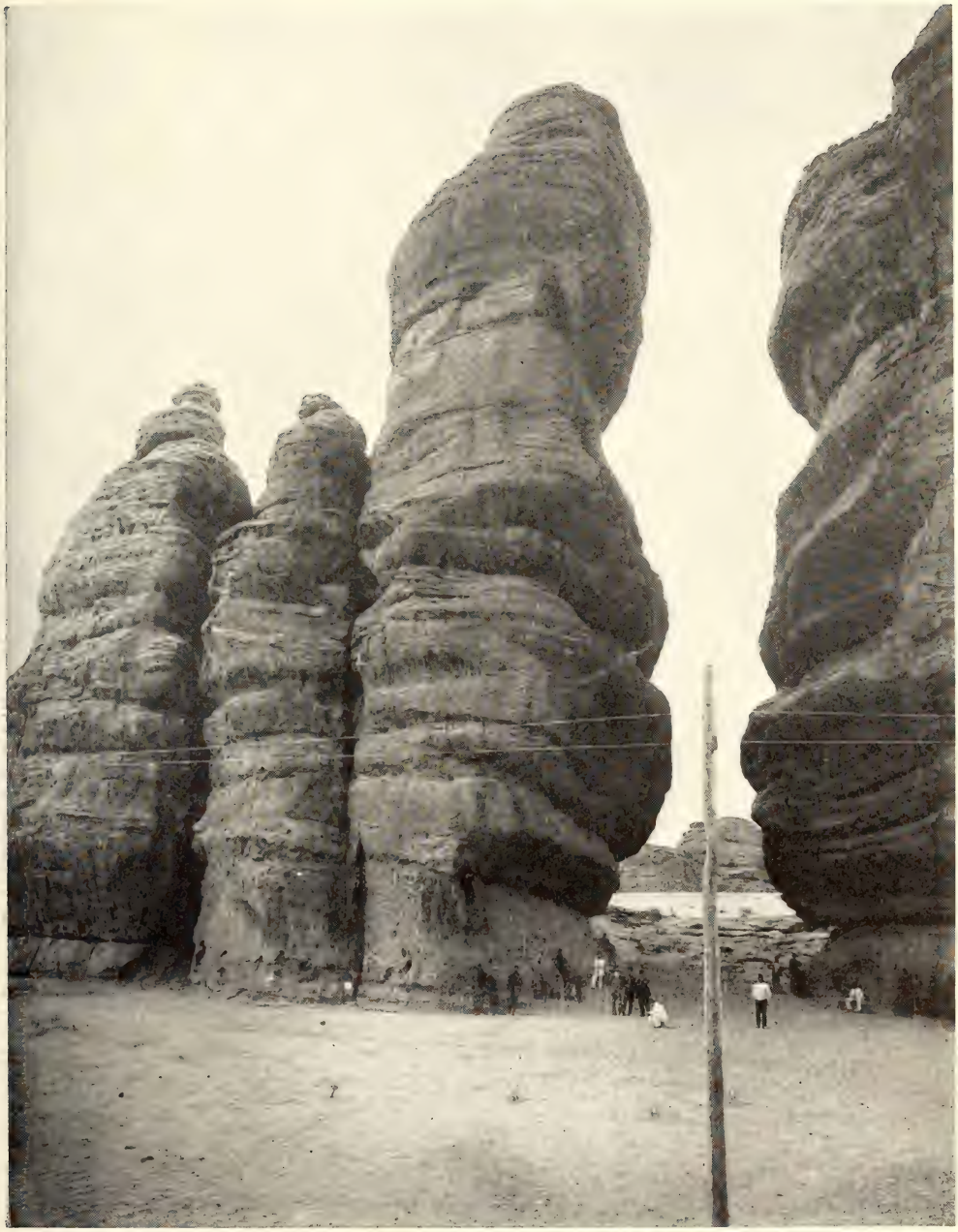
From the station of Batn-el-Ghrul, at the top of the descent, the traveler can walk to the edge of the cliff and take in the immense extent of view which unfolds itself to the south. The escarpment is visible for some 20 miles to the east and is a sheer cliff without, it is said, a single passage of descent. For some 15 miles to the west, also, the escarpment is fairly well defined, until it merges in the high ranges overlooking the Gulf of Akaba. The pilgrim route follows the descent close alongside the line and is comparatively easy. The principal descent is from 3,207 feet at the summit to 3,278 at the foot of the escarpment, or 329 feet altogether.

The view from the summit is extremely striking and comprises a great inland depression, walled in by a continuation of the escarpment on the east, and glowing throughout in the most brilliant and striking colors. The prevailing note is bright red and yellow, changing to violet, purple, and black, so that every tint except green seems to be supplied. The escarpment is of sandstone, which seems to have worn away in some places to sand-drifts of all colors, but principally red and yellow. The spurs of the Tel-esh-Shahim, which run out parallel to the line, are covered with glistening black rocks, at first sight volcanic, but, as I was told by an engineer, they were really of sandstone blackened by the intense heat of the sun. The depression extends south for a distance of about 120 miles. In this clear, dry air every feature is visible. Inquiries regarding the country to the east gave it as an almost waterless region, although a route does exist from Maan to Jauf along which some scanty wells can be found. Towards the Red Sea the district is said to contain a few villages, and a sufficient supply of water from small springs.

An endless series of beautiful mirages unfold themselves as the train toils slowly along these two lines of steel leading through an endless expanse of sand and rocks, varied with an occasional volcanic outcrop raising black-topped hills.

At Tebuk, 430 miles from Damascus, is the first oasis of any size, and here a depot has been formed, at which the railway can recoup itself before another long stretch of nearly waterless desert is entered and the next depot at El Ula reached. A group of buildings for the employés, a small repairing shop, and a hospital with sixty beds form the principal part of the depot.

Tebuk consists of a group of date palms about a half a mile square, deriving water from a large spring walled round in a concrete basin and watched over by another of the masonry forts which mark a pilgrim station. Altogether there were about sixty mud houses, with a few walled gardens be-

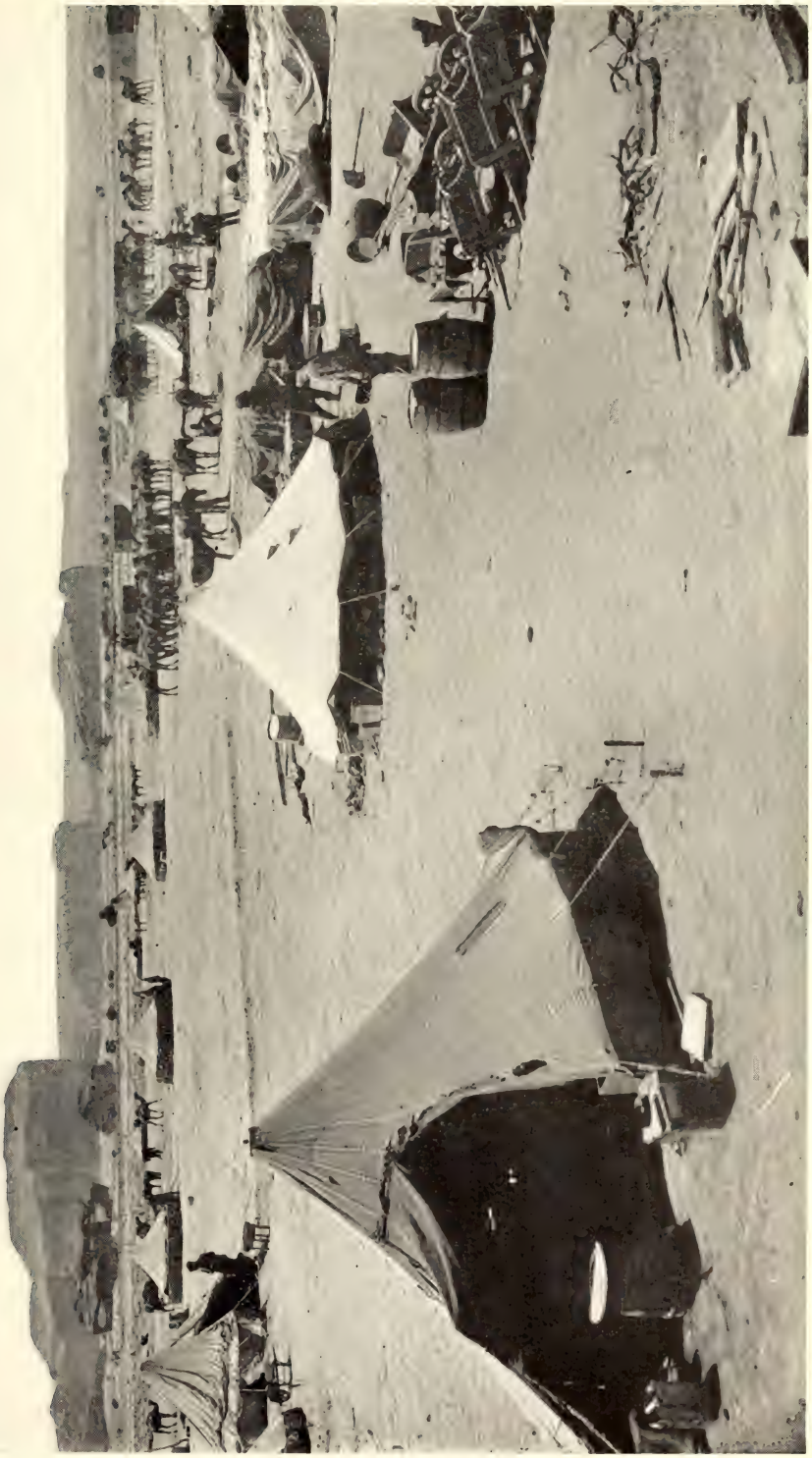


MOUTAKA PILLARS IN ARABIA, SEEN FROM THE RAILWAY TO MECCA

SHEIKS FROM THE DESERT COME TO TEBUK TO SEE THE FIRST TRAIN

INAUGURATING THE OPENING OF THE RAILROAD AT TEBUK BY SACRIFICING SHEEP

ROCK-CUT TOMBS AT MEDAIN SALIH (SEE PAGE 171)



A RAILROAD CAMP IN THE DESERT

HIGH PRIESTS IN MEDINA WELCOMING THE FIRST TRAIN FROM DAMASCUS

longing to the permanent inhabitants of Tebuk. All that were seen were of a distinctly negroid type, different from the nomad Bedouin. The surrounding country is but sparsely inhabited by Arabs.

Besides date palms, there are in the gardens a few lemon trees and pomegranates, and outside are some few fields of wheat, cultivated principally as green fodder. The Italian engineer in charge of this section had managed to make a garden in the sand, where by means of irrigation he grew most kinds of European vegetables, but none of the inhabitants seemed inclined to copy his example.

It seems certain that Mohammed visited Tebuk in his earlier wanderings, and tradition refers to Jebel Sherora as the Pulpit of the Prophet, probably from its commanding position overlooking all the surrounding country.

The rainfall in this country is extremely capricious, and perhaps two or even three years may elapse before there is any appreciable fall here, although at Maan there appears to be always some rain in the spring.

Of animal life there appears to be very little. An antelope, which the Turks call a wild cow, but which looks to be *Oryx beatrix*, is to be found in this district, but only in small numbers. The large troops of gazelle seen north of Maan do not roam here. It is said that the ostrich is occasionally found, and the skin of one specimen is preserved in Maan station.

The desert air is extremely dry and clear, always invigorating, and even the great heat in summer is not as insupportable as in a damper climate, where the thermometer is probably lower. Climate has, without doubt, a great effect on the human character and intellect, and the nervous, high-strung temperament of the Arab is to a great extent the creation of his environment of desert, with its splendid mirages to fire the imagination and sparkling air to keep the nerves always alert.

South of Tebuk want of water is again a great difficulty, and the small posts have to be supplied daily from the train.

At Medain-Salih the valley widens a little, and here are found some rock-cut tombs similar to those at Petra, but far fewer and less ornate. Traces of a town exist, but there is nothing now visible except the usual fort of the pilgrim. Here again, as well as at Tebuk, the site would seem a favorable one for trying artesian wells, but no attempts have been made to prove their success or otherwise.

The permanent way has been laid throughout by Turkish soldiers, but the station buildings, all of very solid masonry, as well as bridges and culverts, of which there are a great number, have been constructed mostly by Italian workmen, with some Greeks and Montenegrins. As many as three or four hundred Italian workmen were employed at one time on the works near Tebuk, and so little did fanaticism come into play that they built the fine new mosque at Tebuk. Subsequently they instructed some Turkish engineers, who continued the work from El Ula to the Holy City itself.

It is difficult to think of this railway becoming a great highway or developing any great trade with Central Arabia, as the section from Maan to Medina traverses an unproductive country without possibility of development, and the interior of Arabia has no surplus products to dispose of. In any case, when the line reaches the sea, at Sherm Rabigh, it is probable that any trade, either export or import, to Medina or Mecca will pass through that port in preference to the long land journey.

The following summary of distances shows the extent of the line:

Damascus	to Maan	285	miles
"	to Tebuk	430	"
"	to El Ula	609	"
"	to Medina	820	"
"	to Mecca	1097	"

The gauge of the line is the somewhat curious one of 1.05 meter (3 feet 5¼ inches), which was necessary, when the line was first commenced, to correspond

MOSLEM WOMEN IN A VILLAGE OF ASIA MINOR

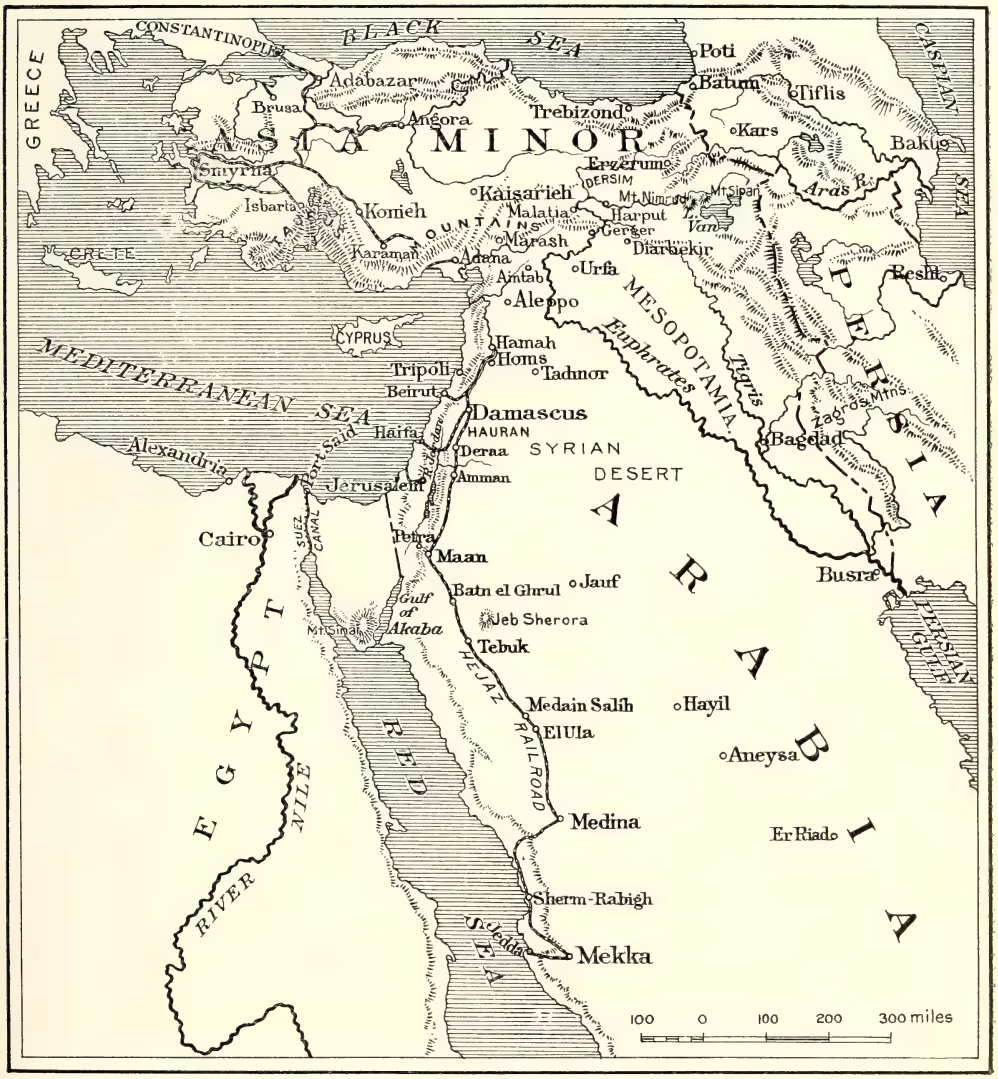
with the gauge of the Beirut-Damascus line, over which the rolling stock had to be brought. The branch to the Mediterranean, at Haifa, was constructed subsequently. The rolling stock has been obtained principally from Belgium, with the exception of the engines, which are made by a German firm. The rails were supplied by the American Steel Trust, by a French firm domiciled in Russia, and by the firm of Cockerill, in Belgium.

The engineers in charge of sections were also of various nationalities—French, Poles, Hungarians, etc.—while the guiding spirit in the construction has been Meissner Pasha, a very able German engineer. But besides these the general direction has been under Marshal Kiazim Pasha, to whom the greatest credit is due in bringing the line successfully into Medina, and to Hajji Mukhtar Bey, a brilliant Turkish engineer, who has absorbed all modern methods of construction, and completed the last section into Medina without European assistance.

In conclusion, it is difficult which to admire the most, this far-reaching conception of His Majesty the Sultan—to build the line and thus to further the interests of his religion and bind together the outlying portions of his empire—or the silent, unswerving devotion of the Turkish soldier who has carried the matter to a conclusion, and who watches without complaint over miles of line through a country almost without water or inhabitants.

SCENES IN ASIA MINOR

THE quaint pictures of the people and country of Central Asia Minor, given on pages 172-193, were sent to this Magazine by Mr H. W. Hicks, of New York, a member of the National Geographic Society. Nearly all the illustrations are from Mr Hicks' camera. They admirably portray every-day life in the Asiatic provinces of the Ottoman Empire, described by Mr Ellsworth Huntington in "The Mountaineers of the Euphrates," published in this number, and in "Sunshine in Turkey," by President Howard S. Bliss, which appeared in the January number of this Magazine.



SKETCH MAP OF ASIA MINOR AND OF THE DAMASCUS TO MECCA RAILWAY

The section from Medina to Mecca is not quite completed

A BULLOCK TRAIN HAULING GRAIN TO MARKET

A YOUNG ARMENIAN COUPLE MOVING TO A NEW HOUSE

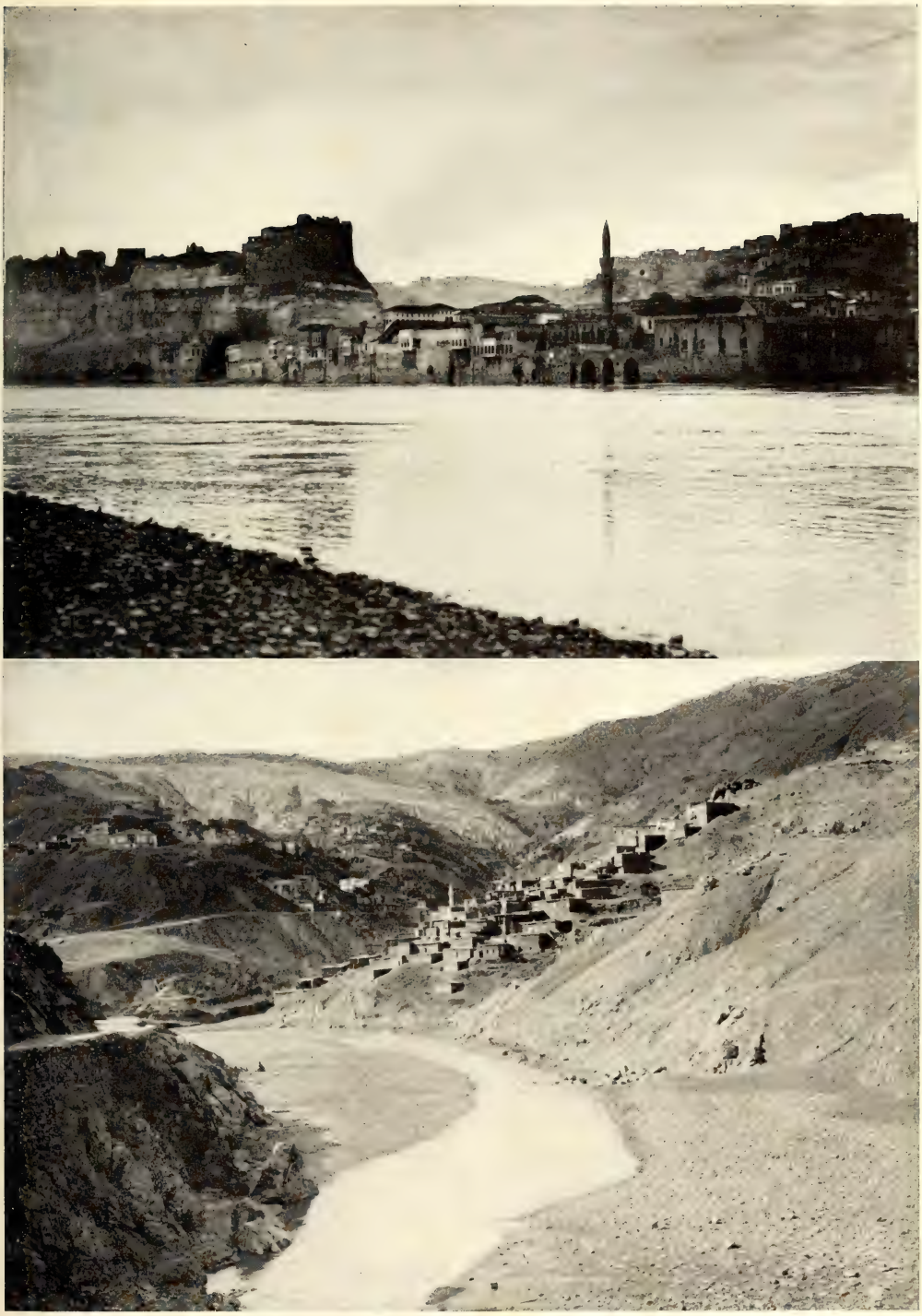
The cart wheels are set tight on the axle, which revolves instead of the wheels

A MULE TRAIN CARRYING GRAIN ON THE PLAINS OF ASIA MINOR

SHEPHERD AND ANGORA GOATS

A VILLAGE CARAVANSERAI WHERE TRAVELERS ARE HERDED WITH THEIR PACK TRAINS AT NIGHT

A CAMEL TRAIN TAKING THE NOONDAY REST



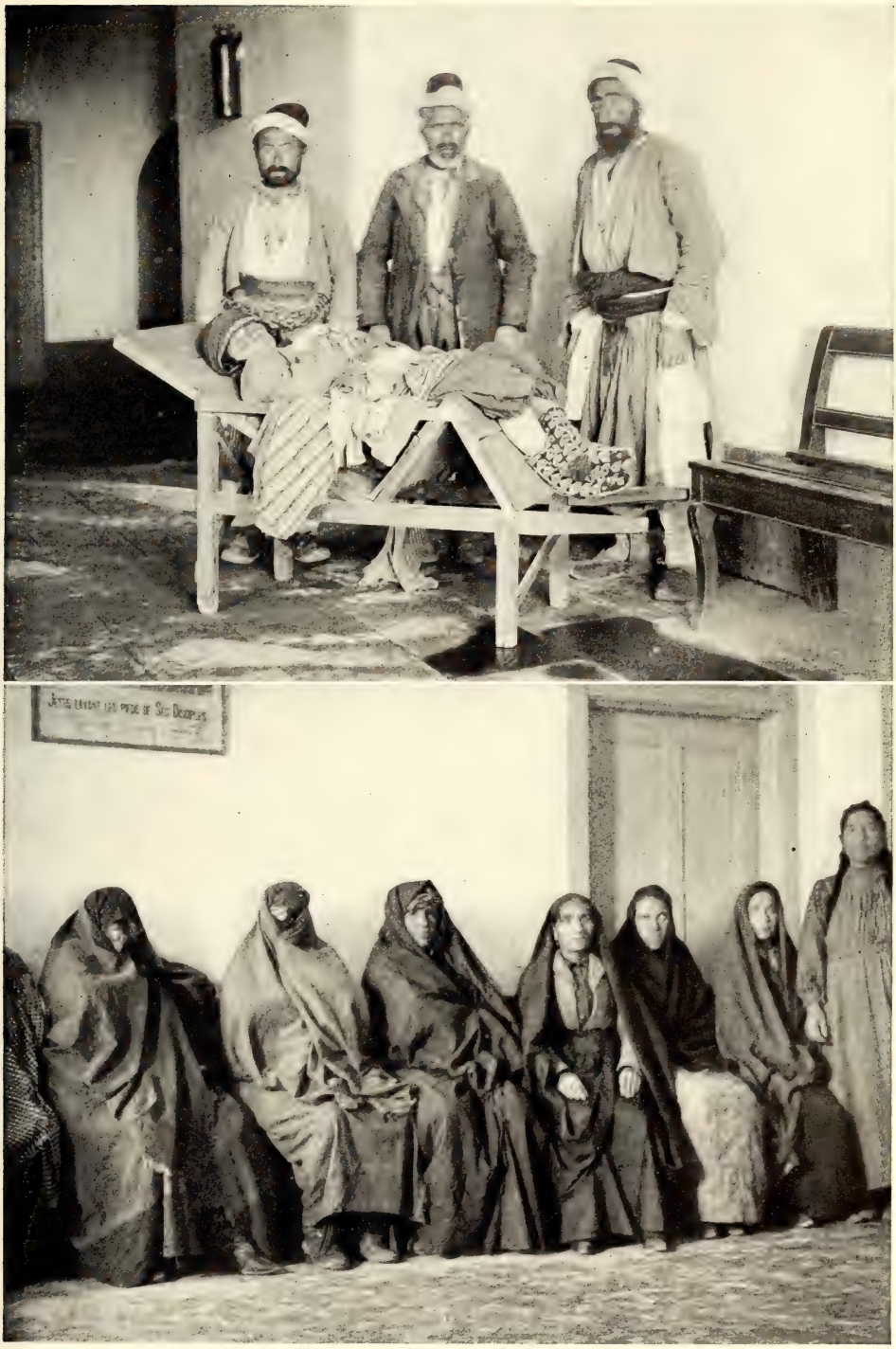
THE EUPHRATES RIVER NEAR THE WESTERN BORDER OF MESOPOTAMIA: AN ANCIENT CASTLE ON CLIFF ON LEFT

IN THE GORGE OF THE TIGRIS RIVER: TAURUS MOUNTAINS

This is the location of the most famous and richest copper mine in Turkey

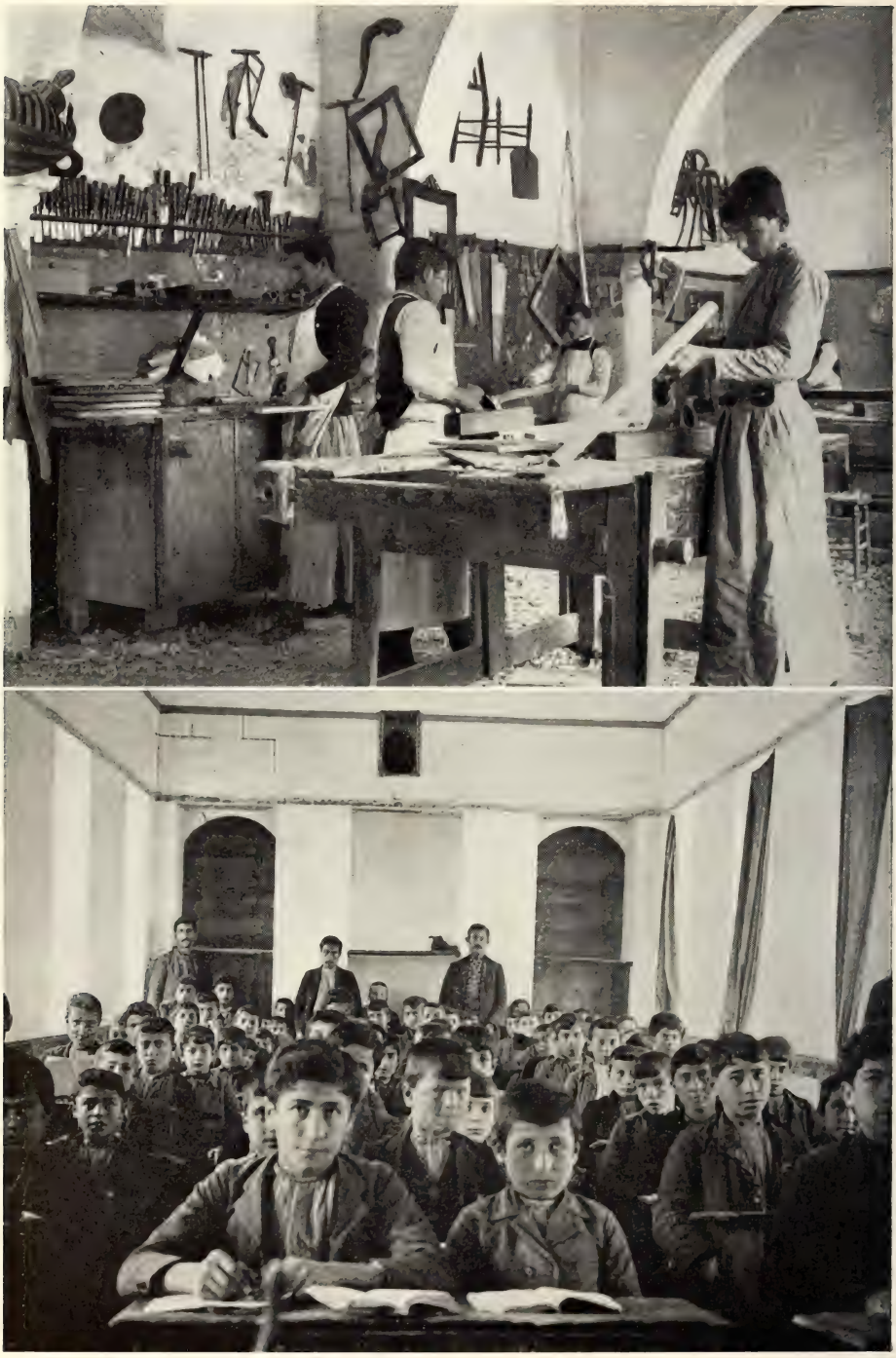
ARMENIAN CHILDREN IN AN AMERICAN SCHOOL IN ASIA MINOR

TWO BLIND ORPHANS IN THE AMERICAN SCHOOL FOR THE BLIND: URFA



A TURKISH WOMAN CARRIED ON A NATIVE LITTER TO THE AMERICAN CHRISTIAN HOSPITAL: AINTAB

WOMEN WAITING FOR TREATMENT IN THE AINTAB DISPENSARY: MOSLEMS ON LEFT, ARMENIANS ON RIGHT



THE CARPENTER SHOP IN THE AMERICAN INDUSTRIAL SCHOOL: URFA

ARMENIAN ORPHANS FROM THE MASSACRES OF 1894-5 IN SCHOOL SUPPORTED BY THE SECOND ARMENIAN EVANGELICAL CHURCH OF AINTAB

VILLAGE WOMEN SORTING COARSE NATIVE GRAIN, WHICH HAS BEEN BOILED AND DRIED

VILLAGE WOMEN SPINNING NEAR URFA

A CARTLOAD OF GRAPES: ASIA MINOR

ARABS, ONE WEARING KURDISH COSTUME AND THE OTHER A SHEPHERD'S FUR COAT: ASIA MINOR

A TURKISH POLICEMAN AND TWO TURKISH DRIVERS

TURKISH TROOPS WHO ARE BEING TREATED IN THE CENTRAL TURKEY COLLEGE HOSPITAL: TWO DAYS NORTH OF ALEPPO

ARABIAN BOYS IN A LONELY KAHN ON THE DESERT OF MESOPOTAMIA

SCENE IN A GREGORIAN CHURCH SCHOOL IN MESOPOTAMIA

Note priest in background

ARMENIANS OF MARASH

MAKING TURKISH TOMBSTONES

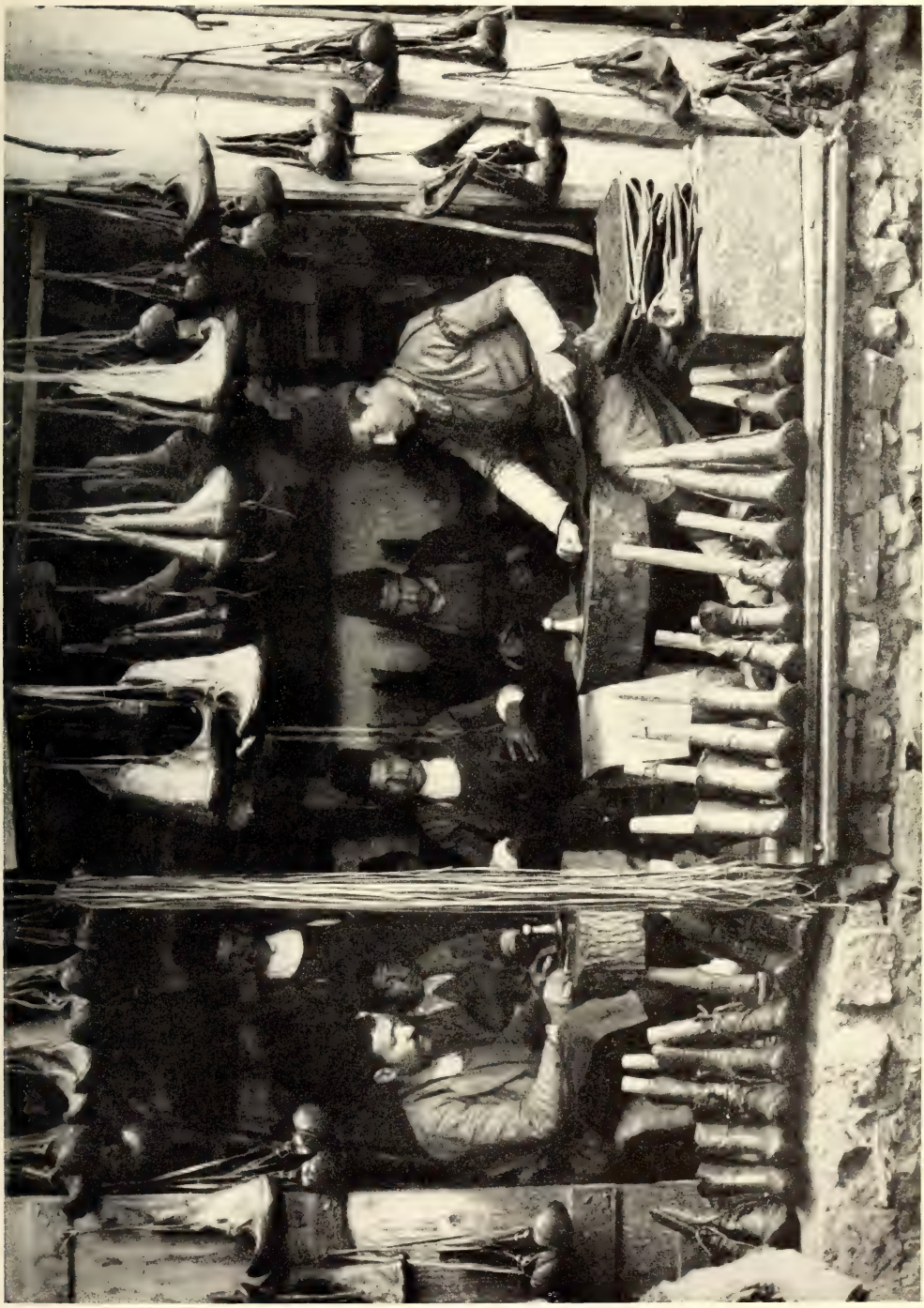
CITY WALL AND PRECIPICE SURROUNDING DIARBEKIR

ANOTHER VIEW OF THE WALL OF DIARBEKIR

KURDISH MOSLEMS ON PLAINS OF SURUJ, NEAR AINTAB

Mud houses of conical shape are found only in this region of Western Mesopotamia

MAKING STAMPED AND EMBROIDERED SADDLERY IN A TURKISH TOWN IN ASIA MINOR



MAKING TURKISH SHOES AND SLIPPERS

PREPARING COTTON FOR WEAVING: GINNING, BEATING, AND SPINNING: ASIA MINOR

A VEGETABLE SHOP IN A TURKISH TOWN IN ASIA MINOR

TURKISH TANNERS: ASIA MINOR

BOYS CARRYING LUNCH TO WORKMEN IN MARASH

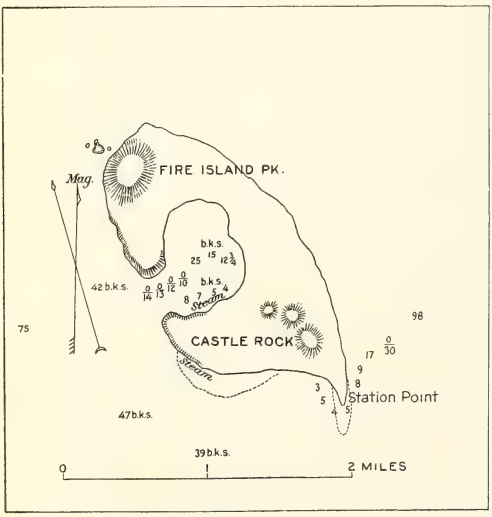
A JACK IN THE BOX

An Account of the Strange Performances of the Most Wonderful Island in the World

By Captain F. M. Munger, Senior Captain U. S. R. C. S.

THE following relating to recent changes that have taken place in the Bogoslof volcano of the Aleutian Islands, Alaska, and the accompanying photographs, may be of interest to the readers of the National Geographic Magazine:

1. Bogoslof volcano was discovered about 1790 by the Russian admiral of



BOGOSLOF ISLAND IN SEPTEMBER, 1908

that name; it was then but one island, now called Castle Island.

2. During the winter of 1886-87 a new island appeared two and one-half miles west-northwest from Castle Island, which was named Fire Island. A narrow neck of land connected these two islands, but a gradual subsidence took place, and by 1900 there was a passage between the two with not less than seven fathoms of water. These islands are probably thrown up from a deep-sea volcano, as they come from great depths, the 1,000-fathom curve being less than four miles to the northwest.

3. During the winter of 1905-06 there appeared a new peak about half way between the old islands. When this peak developed it formed connection with Fire Island and left a passage between it and Castle Rock in which the least depth of water was five fathoms. This peak was surveyed by officers from the United States revenue cutter *Perry*, in June, 1906, and was named Perry Peak (see page 195).

4. During the winter of 1906-07 another peak appeared, absorbing in its uplift about half of Perry Peak, and filling in the space to Castle Rock, thus making one island of the group.

5. July 4, 1907, officers from the United States revenue cutter *McCulloch* made a survey of this peak and named it McCulloch Peak. This peak was 2,000 feet through its base and 495 feet high (see page 196).

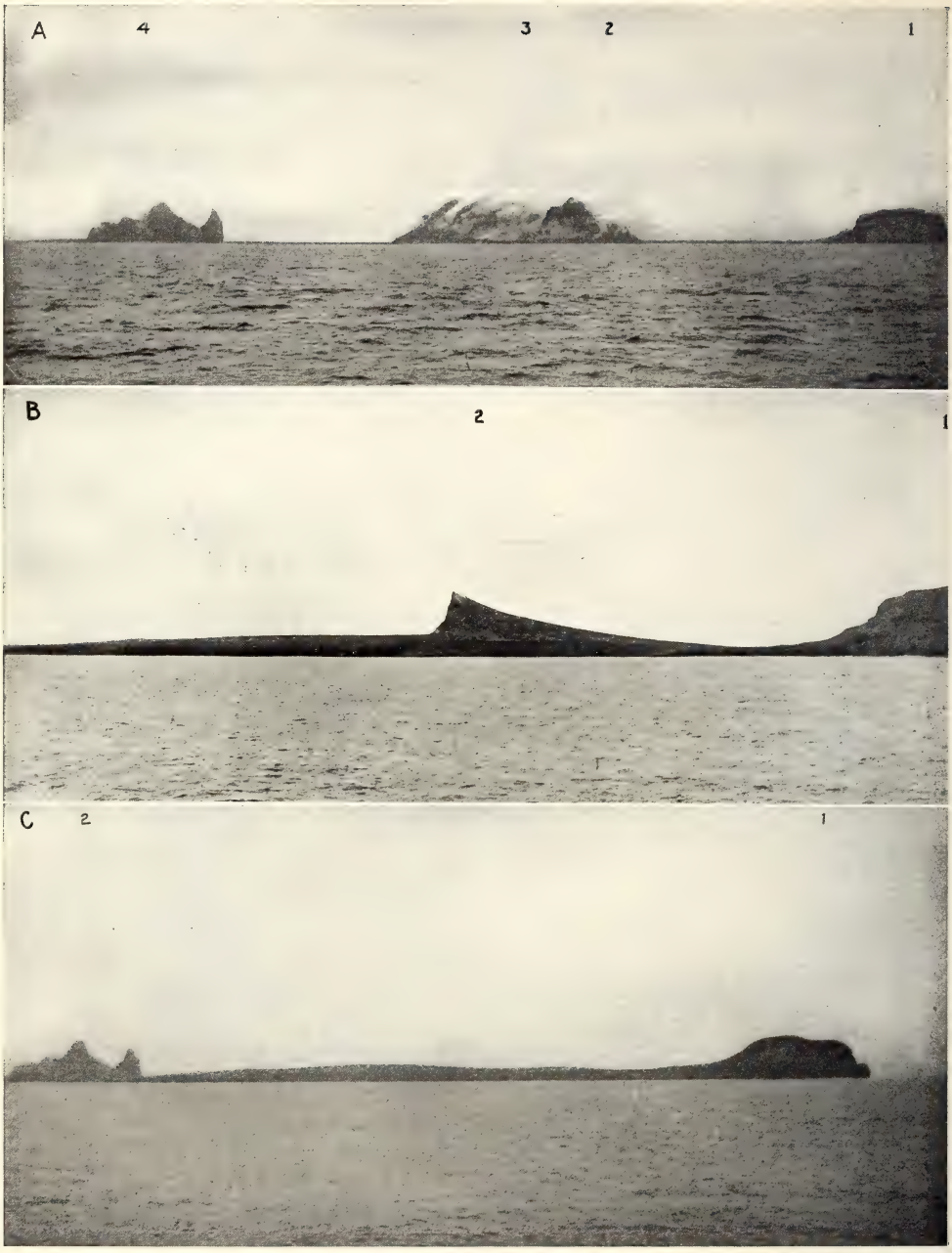
6. October 15, 1907, the *McCulloch* again visited the island and found McCulloch Peak had disappeared, and where it stood a large harbor had formed, with outlet to the sea near Castle Rock.

7. It is thought this peak exploded September 1, 1907, as on that date, at 5 p. m., a dense black cloud passed over Unalaska Island, covering the land with ashes, falling to a depth of three-sixteenths of an inch on the board walks in Iliuliuk, sixty miles from Bogoslof.

8. July, 1908, officers from the United States revenue cutter *Rush* made a survey of the island and found great changes. Perry Peak had disappeared; a high ridge of land extended from Fire Island to Castle Rock, having an elevation of about three hundred feet at the highest point; the entrance to the harbor near Castle Rock had filled in, high land formed to the west, and an entrance opened to the west-northwest, near Fire Island.

A VIEW OF PERRY PEAK IN JUNE, 1906

This peak rose from the ocean depths in the winter of 1905-1906. It has since disappeared. Photo from Capt. F. M. Munger



A. PHOTO TAKEN JULY 4, 1907

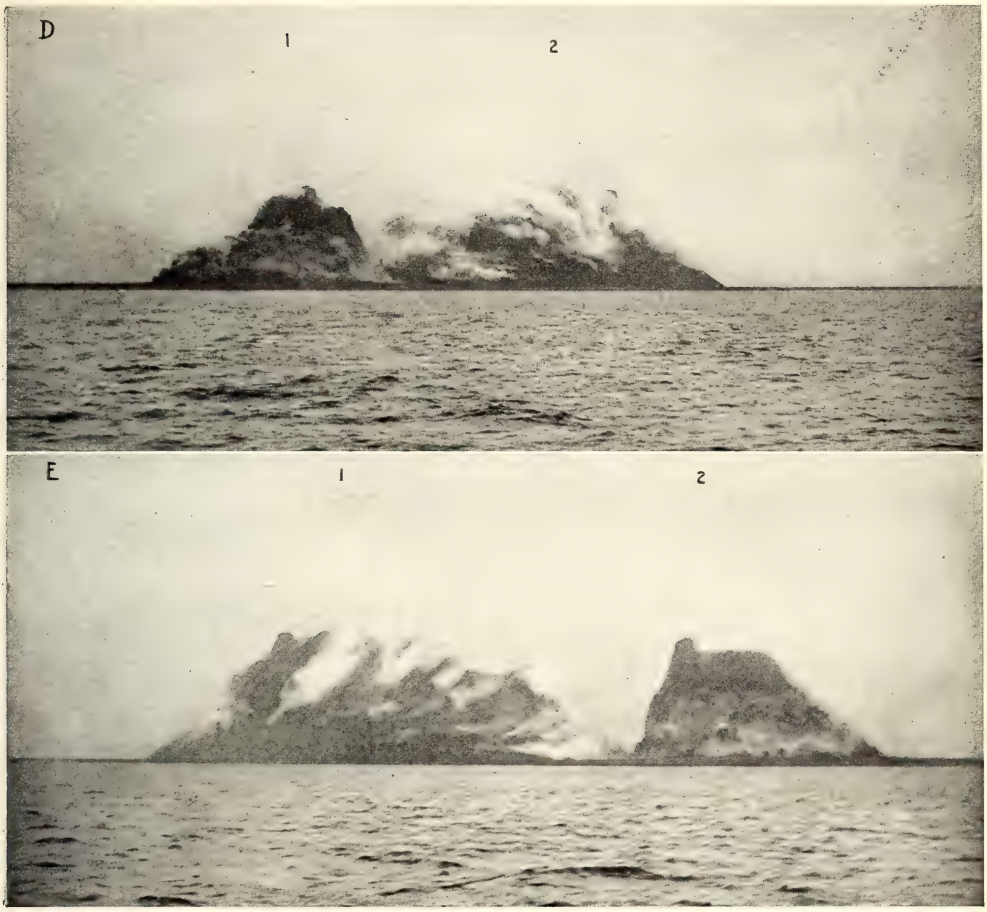
1. Fire Island, which rose from the sea in 1887. 2. Perry Peak, which rose in 1905–06. 3. McCulloch Peak, which appeared in 1906–07. 4. Castle Island, discovered by Admiral Bogoslof in 1790.

B. PHOTO TAKEN OCTOBER 15, 1907

1. Fire Island. 2. Perry Peak. McCulloch Peak has disappeared. Castle Island is off the photo to the left

C. PHOTO TAKEN JULY, 1908

1. Fire Island. 2. Castle Island. Perry has disappeared and a high ridge of land has been formed between the two islands. All three photos taken with Perry Peak bearing southwest. Photos from Capt. F. M. Munger.



D. PHOTO TAKEN JULY 4, 1907, WITH THE PEAKS BEARING NORTHWEST

1. Perry Peak. 2. McCulloch Peak

E. PHOTO TAKEN JULY 4, 1907, WITH THE PEAKS BEARING SOUTHWEST

1. McCulloch Peak. 2. Perry Peak. Two months after these photos were taken McCulloch Peak exploded and its ashes were scattered on the islands to the southeast for a distance of 70 miles. At Unalaska, 60 miles away, there fell 3/16 of an inch in one hour, then followed a fierce rain. Photos from Capt. F. M. Munger.

The navigator of the *Rush* made a survey of the harbor and found it to be about one mile across, with from four to twenty-five fathoms of water; black sand bottom; temperature of water, 46 F. The shore to the south of the harbor was steaming (photographs C., F., and sketch).

9. In September, 1908, the *McCulloch* visited the island and found the southwest portion smoking; shoals had made out from the northeast and east sides, and patches of discolored water were observed to the north and northwest. Bad weather and rough sea prevented further survey.

10. The following relative to formation is quoted from the report of First Lieutenant B. H. Camden, U. S. R. C. S., who surveyed the island July 4, 1907:

"The formation consists of disintegrated rock, basalt, feldspar, scoria, tufa, pumice, obsidian, trachyte, other igneous rock, and volcanic mud, all more or less discolored with a deposit of sulphur."

SOLAN GEESE FLYING THROUGH THE STEAM AND FUMES OF PERRY PEAK

They breed on Fire Island, from which this view of Perry Peak was taken in July, 1906, by Robert Dunn

SEA LIONS DISPORTING ON CASTLE ISLAND

Here, on the old portion of Bogoslof Island, they rear their offspring utterly indifferent of the frequent convulsions of nature occurring within a few hundred yards. Photo by Robert Dunn

CONDITIONS IN CUBA AS REVEALED BY THE CENSUS*

By Henry Gannett

In the autumn of 1907 a census of the population of Cuba was taken. The primary purpose of this census was to obtain, by means of non-partisan machinery, a list of the persons qualified to vote, to serve as a basis for the then approaching municipal and national elections. Because such was the primary purpose, the census was not extended to include the industries of the island, but related solely to the population. The questions asked differed but little from those employed in the Cuban census of 1899 and in the census of the Philippines.

The results of this census were tabulated by the United States Census Office and a report, printed in Spanish only, is about to be issued. From the results I have brought together a few of the more striking facts.

The civil organization of Cuba is as follows:

The island is divided into 6 provinces, and these provinces into 82 municipalities. These municipalities are in turn divided into 1,069 barrios, the "barrio" being the smallest political subdivision of the island. There are no cities, towns, villages, or boroughs, as we understand those terms. The urban parts of the municipalities are not separated from the adjoining rural parts. It is possible, however, in the case of most centers of population, to make an approximate separation by means of the barrios, certain of the barrios of a municipality being composed mainly, if not entirely, of urban or of rural inhabitants.

A REMARKABLE NATURAL INCREASE IN POPULATION

The population of Cuba on September 30, 1907, was 2,048,980; at the census next preceding, taken under American administration, in 1899, at the close of the Spanish-American War, the population was 1,572,797.

The rate of increase in these eight years is not less than 30 per cent, or at the rate of 39 per cent per decade. This is a very rapid rate of increase—greater than that of any country with which I am acquainted.

This increase has not been brought about by immigration, for in the eight years the net immigration (that is, the excess of arrivals over departures) numbered only 75,000, and the element of foreign birth increased from 11 per cent to 11.2 per cent only, but it has been brought about almost entirely by the excess of births over deaths. During the years of revolution, when a large part of the men were away from their homes fighting for freedom, marriages and births were very few, and at the close of the war there were great arrears to be made up. The natural result followed—an astonishing birth rate, which is shown in the fact that by the last census the number of children under five years of age, who, of course, have been born since the war, accounts for three-fourths of the increase in population.

One peculiar phenomenon of this increase is that the rural population has gained much more rapidly than has the urban—a condition which rarely exists, as in nearly every country in the world the drift of population is toward the cities.

The urban population, including all places of 1,000 inhabitants and over, was 43.9 per cent of the total population. In 1899 it was 47.1 per cent. If the urban population be limited to towns of 8,000 inhabitants, the proportion was 30.3 per cent. The chief cities are Habana, with 297,159 inhabitants, or about one-seventh

*Paper read before the American Association of Geographers, January 2, 1909.

of the population of Cuba; Santiago de Cuba, 45,470; Matanzas, 36,009; Cienfuegos, 30,100; and Camaguey, 29,616. The number of inhabitants per square mile in the island as a whole was 46.5, or about the same as in Missouri, Virginia, or South Carolina.

The foreign-born population formed 11.2 per cent of the total. Of this element, four-fifths were born in Spain and less than 3 per cent in the United States; Chinese and Africans were more numerous than United States people. The slave trade was officially abolished early in the present century, but that it continued as a contraband traffic until comparatively recent years is shown by the fact that nearly 8,000 negroes on the island reported themselves as having been born in Africa.

Among the people born in Cuba the sexes were very nearly equally divided, while among the foreign-born more than four-fifths were males.

THE COLORED POPULATION IS NOT HOLDING ITS OWN

As to color, about seven-tenths of the population were white, the remaining three-tenths being colored, including negroes, mixed, and a few thousand Chinese. As in the United States, the colored element is increasing less rapidly than is the white population, owing here both to a smaller birth rate and a larger death rate. The native whites formed nearly three-fifths of the entire population.

Some of the features of the distribution by age are of interest. The proportion of young children, as has already been noted, was very large, those under 1 year forming 3.2 per cent of the whole population, while in the United States they formed only 2.5 per cent. Those under 5 years of age were 16.8 per cent, contrasting with 9.5 per cent in the United States. On the other hand, the proportion of people of advanced age was small; those over 50 years of age formed only 10 per cent, while in the United States the percentage was 13.2 per cent.

The children of school age, 5 to 17 years, present a curious phenomenon, the number being actually 11,500 less in this census than in that of 1899. The war and the accompanying reconcentration caused the death of vast numbers of young children, most of whom were under the school age. The survivors are now 8 years older and constitute a large proportion of the school-age class, while the numerous children born since the war have hardly reached the school age. At the recent census the children of school age formed only 26.4 per cent of the population, while the same class in 1899 was not less than 35.1 per cent, and in the United States was 33.8 per cent.

Among the aged there is apparently the same tendency to exaggerate ages as exists in this country and elsewhere, and this tendency is of course more marked among the ignorant classes. In Cuba 0.2 per cent of the whites reported themselves as 80 years of age or more, while of the colored not less than 1.2 per cent were so reported. Of the white population who reported themselves to be over 100 years, the number was too small to be expressed in a percentage, but of the colored 0.1 per cent reported themselves as centenarians.

The average age of the Cuban was 23.4 years, which is strongly contrasted with that of the United States—26.3 years—a difference of almost 3 years in average age. The males of voting age formed 27 per cent of the population, or very nearly that of the United States, which is 28 per cent. The native-born males of voting age, who practically constitute the voting strength of the people, formed 21 per cent of the population.

MARRIAGES IN CUBA

The conjugal condition of the Cubans presents some points of interest. There are practically no divorced persons, since the Roman Catholic Church does not tolerate that condition. There is a class, however, which is not recognized in this country, to which the name of "consensual union" or "consensual marriage"

has been applied, referring to man and woman living together, having waived the marriage ceremony. The reason for this condition is the large fee demanded by the church for performing the marriage ceremony, which the poorer class is unable to pay. This class of consensually married persons is found in most Spanish-speaking countries, but it is probably larger in Cuba than elsewhere, being 8.8 per cent of the population, while the proportion of legally married was 20.7 per cent. This proportion, whether we consider only the legally married, 20.7 per cent, or both kinds of marriages together, 29.5 per cent, was much smaller than in most countries, and contrasts strongly with the proportion in the United States, 36.5 per cent. Consensual marriages were vastly more common among the colored than among the white inhabitants. Of the whites, 25.6 per cent of the total were legally married and but 4.8 per cent were consensually married, while among the colored people less than 10 per cent were lawfully married, while 17.4 were consensually married.

It is popularly supposed that Cubans, like all Latin races, marry young, but as far as the figures show they marry but little, if any, younger than the people of the United States. The single persons comprised 66.8 per cent, or about two-thirds of the total, and the widowed 3.9 per cent. In classifying the single persons by age it appears that the proportion reaches a minimum in middle life and then increases. This is a result of consensual marriage, for as one partner of such a union dies the survivor enters the ranks of the single instead of the widowed.

EXCELLENT PROGRESS IN EDUCATION

The public-school system, organized under the first intervention in Cuba, is producing excellent results. Of the population 10 years of age and over, 56.6 per cent could read, showing a decided gain in that respect since 1899. Of the native whites, 58.6 per cent could read, and of the colored 45 per cent were similarly educated. The proportion of literates was naturally much greater in the cities than in the country, and highest of all in Habana.

Of the whole population, 37.7 per cent were wage-earners—a proportion but slightly less than in the United States, where it was 39 per cent. Of all males, 65 per cent were wage-earners, and of females, only 7.5 per cent. Child labor was prevalent; of boys between 10 and 14 years of age, 27.8 per cent were wage-earners, and of those between 15 and 19 years, not less than 87.1 per cent, or about seven-eighths.

By distributing wage-earners among certain great groups of avocations, one gets an idea of the relative importance of the industries which they represent. Thus, farming, fishing, and mining, collectively, employed 48.5 per cent, or nearly one-half of the wage-earners; domestic and personal service claimed 16 per cent; manufacturing and the mechanic arts, 16.3 per cent; trade and transportation, 17.6 per cent, or about one-sixth each; and the professions claimed 1.6 per cent. It appears that trade and transportation, manufacturing, and domestic and personal service employed about equal numbers, and collectively they claimed about the same number as farming, fishing, and mining.

A WASTEFUL NATION

BILLIONS of dollars are thrown away each year by the American people, according to the first report of the Conservation Commission, submitted to President Roosevelt on January 22, 1909. The report contains an impressive series of figures, which have been prepared very carefully by the most expert authorities of the United States government and may be regarded as conservative.

The following paragraphs are reprinted from the report for the information of the readers of this Magazine. The figures are so extraordinary that they need no comment:

The mineral production of the United States for 1907 exceeded $2,000,000,000, and contributed 65 per cent of the total freight traffic of the country. The waste in the extraction and treatment of mineral products during the same year was equivalent to more than $300,000,000.

The production for 1907 included 395,000,000 tons of bituminous, and 85,000,000 tons of anthracite coal, 166,000,000 barrels of petroleum, 45,000,000 tons of high-grade and 11,000,000 tons of low-grade iron ore, 2,500,000 tons of phosphate rock, and 869,000,000 pounds of copper. The values of other mineral products during the same year included clay products, $162,000,000; stone, $71,000,000; cement, $56,000,000; natural gas, $50,000,000; gold, $90,000,000; silver, $37,000,000; lead, $39,000,000, and zinc, $26,000,000.

OUR IRON ORE SUFFICIENT FOR 50 YEARS ONLY

The available and easily accessible supplies of coal in the United States aggregate approximately 1,400,000,000,000 tons. At the present increasing rate of production this supply will be so depleted as to approach exhaustion before the middle of the next century.

The known supply of high-grade iron ores in the United States approximate 3,840,000,000 tons, which at the present increasing rate of consumption cannot be expected to last beyond the middle of the present century. In addition to this, there are assumed to be 59,000,000,000 tons of lower-grade iron ores, not available for use under existing conditions.

The supply of stone, clay, cement, lime, sand, and salt is ample, while the stock of the precious metals and of copper, lead, zinc, sulphur, asphalt, graphite, quicksilver, mica, and the rare metals cannot well be estimated, but is clearly exhaustible within one to three centuries.

The known supply of petroleum is estimated at 15,000,000,000 to 20,000,000,000 barrels, distributed through six separate fields having an aggregate area of 8,900 square miles. The production is rapidly increasing, while the wastes and the loss through misuse are enormous. The supply cannot be expected to last beyond the middle of the present century.

The known natural-gas fields aggregate an area of 9,000 square miles, distributed through 22 States. Of the total yield from these fields during 1907, 400,000,000,000 cubic feet, valued at $62,000,000, were utilized, while an equal quantity was allowed to escape into the air. The daily waste of natural gas—the most perfect known fuel—is more than 1,000,000,000 cubic feet, or enough to supply every city in the United States of more than 100,000 population.

OUR WASTE IS ON THE INCREASE

The consumption of nearly all our mineral products is increasing far more rapidly than our population. In many cases the waste is increasing more rapidly than the number of our people. The consumption of coal is over 5 tons and the waste nearly 3 tons per capita.

At the beginning of our mineral development the coal abandoned in the mine was two or three times the amount taken out and used. Now the mine waste averages little more than half the amount saved. The chief waste is in imperfect combustion in furnaces and fire boxes. Steam engines utilize on the average about 8 per cent of the thermal energy

of the coal. Internal-combustion engines utilize less than 20 per cent, and in electric lighting far less than 1 per cent of the thermal energy is rendered available.

Some lignites and other low-grade coals are readily gasified, and, through the development of internal-combustion engines, check the consumption of high-grade coals. Peat is becoming important; it is estimated that 14,000,000,000 tons are available in the United States. Its value is enhanced because of distribution through States generally remote from the fields of coal, oil, and natural gas.

The building operations of the country now aggregate about $1,000,000,000 per year. The direct and indirect losses from fire in the United States during 1907 approximated $450,000,000, or one-half the cost of construction. Of this loss four-fifths, or an average of $1,000,000 per day, could be prevented.

There is urgent need for greater safety to the miner. The loss of life through mine accidents is appalling, and preventive measures cannot be taken too soon.

The national government should exercise such control of the mineral fuels and phosphate rocks now in its possession as to check waste and prolong our supply.

The total land area of continental United States is 1,900,000,000 acres. Of this but little more than two-fifths is in farms, and less than one-half of the farm area is improved and made a source of crop production. We have nearly 6,000,000 farms; they average 146 acres each. The value of the farms is nearly one-fourth the wealth of the United States. The number of persons engaged in agricultural pursuits is more than 10,000,000.

We grow one-fifth of the world's wheat crop, three-fifths of its cotton crop, and four-fifths of its corn crop. We plant nearly 50,000,000 acres of wheat annually, with an average yield of about 14 bushels per acre; 100,000,000 acres of corn, yielding an average of 25 bushels per acre, and 30,000,000 acres of cotton, yielding about 12,000,000 bales.

We had on January 1, 1908, 71,000,000 cattle, worth $1,250,000,000; 54,000,000 sheep, worth $211,000,000, and 56,000,000 swine, worth $339,000,000. The census of 1900 showed $137,000,000 worth of poultry in this country, which produced in 1899 293,000,000 dozen eggs.

There has been a slight increase in the average yield of our great staple farm products, but neither the increase in acreage nor the yield per acre has kept pace with our increase in population.

THE YIELD PER ACRE MUCH LESS THAN IN ENGLAND AND GERMANY

In addition to the land awaiting the plow 75,000,000 acres of swamp land can be reclaimed, 40,000,000 acres of desert land irrigated, and millions of acres of brush and wooded land cleared. Our population will increase continuously, but there is a definite limit to the increase of our cultivated acreage. Hence we must greatly increase the yield per acre. The average yield of wheat in the United States is less than 14 bushels per acre, in Germany 28 bushels, and in England 32 bushels. We get 30 bushels of oats per acre, England nearly 45, and Germany more than 47.

The loss to farm products due to injurious mammals is estimated at $130,000,000 annually; the loss through plant disease reaches several hundred million dollars and the loss through insects is reckoned at $659,000,000. The annual losses from disease among domestic animals are: Horses, 1.8 per cent; cattle, 2 per cent; sheep, 2.2 per cent, and swine, 5.1 per cent. Most of these farm losses are preventable.

The product of the fisheries of the United States has an annual value of $57,000,000. Fish culture is carried on by the nation and the States on an enormous scale. Most of the more important food species are propagated. Fish from forest waters furnish $21,000,000 worth of food yearly.

Our wild game and fur-bearing animals have been largely exterminated. To prevent their complete extinction the States and the United States have taken

in hand their protection, and their numbers are now increasing. Forest game yields over $10,000,000 worth of food each year.

Each citizen of the United States owns an equal undivided interest in about 375,000,000 acres of public lands, exclusive of Alaska and the insular possessions. Besides this there are about 235,000,000 acres of national forests, national parks, and other lands.

Good business sense demands that a definite land policy be formulated. The national conservation commission believes that the following will serve as a basis therefor:

1. Every part of the public lands should be devoted to the use which will best subserve the interests of the whole people.

2. The classification of all public lands is necessary for their administration in the interests of the people.

3. The timber, the minerals, and the surface of the public lands should be disposed of separately.

4. Public lands more valuable for conserving water supply, timber, and natural beauties or wonders than for agriculture should be held for the use of the people from all except mineral entry.

5. Title to the surface of the remaining non-mineral public lands should be granted only to actual home-makers.

6. Pending the transfer of title to the remaining public lands they should be administered by the government and their use should be allowed in a way to prevent or control waste and monopoly.

The present public land laws as a whole do not subserve the best interests of the nation. They should be modified so far as may be required to bring them into conformity with the foregoing outline of policy.

WASTE IN FORESTS

We take from our forests yearly, including waste in logging and in manufacture, 23,000,000,000 cubic feet of wood. We use each year 100,000,000 cords of firewood; 40,000,000,000 feet of lumber; more than 1,000,000,000 posts, poles, and fence rails; 118,000,000 hewn ties; 1,500,000,000 staves; over 133,000,000 sets of heading; nearly 500,000,000 barrel hoops; 3,000,000 cords of native pulp wood; 165,000,000 cubic feet of round mine timbers, and 1,250,000 cords of wood for distillation.

Since 1870 forest fires have destroyed a yearly average of 50 lives and $50,000,000 worth of timber. Not less than 50,000,000 acres of forest is burned over yearly. The young growth destroyed by fire is worth far more than the merchantable timber burned.

One-fourth of the standing timber is lost in logging. The boxing of long-leaf pine for turpentine has destroyed one-fifth of the forests worked. The loss in the mill is from one-third to two-thirds of the timber sawed. The loss of the mill product in seasoning and fitting for use is from one-seventh to one-fourth.

Of each 1,000 feet which stood in the forest, an average of only 320 feet of lumber is used.

We take from our forests each year, not counting the loss, three and a half times their yearly growth. We take 40 cubic feet per acre for each 12 cubic feet grown; we take 260 cubic feet per capita, while Germany uses 37 and France 25 cubic feet.

We tax our forests under the general property tax, a method abandoned long ago by every other great nation. Present tax laws prevent reforestation of cut-over land and the perpetuation of existing forests by use.

To protect our farms from wind and to reforest land best suited for forest growth will require tree planting on an area larger than Pennsylvania, Ohio, and West Virginia combined.

An annual tax upon the land itself, exclusive of the value of the timber, and a tax upon the timber when cut, is well adapted to actual conditions of forest investment, and is practicable and certain.

Under right management, our forests will yield four times as much as now. We can reduce waste in the woods and in the mill at least one-third, with present as well as future profit. We can perpet-

uate the naval stores industry. We can practically stop forest fires at a cost yearly of one-fifth the value of the merchantable timber burned.

WATER POWER NEGLECTED

The sole source of our fresh water is rainfall, including snow. Our mean annual rainfall is about 30 inches; the quantity about 215,000,000,000,000 cubic feet per year, equivalent to ten Mississippi Rivers.

Of the 70,000,000,000,000 cubic feet annually flowing into the sea, less than 1 per cent is restrained and utilized for municipal and community supply; less than 2 per cent (or some 10 per cent of that in the arid and semi-arid regions) is used for irrigation; perhaps 5 per cent is used for navigation, and less than 5 per cent for power.

The water power now in use is 5,250,000 horse power; the amount running over government dams and not used is about 1,400,000 horse power; the amount reasonably available equals or exceeds the entire mechanical power now in use, or enough to operate every mill, drive every spindle, propel every train and boat, and light every city, town, and village in the country.

SAVING OF LIVES

Since the greatest of our national assets is the health and vigor of the American people, our efficiency must depend on national vitality even more than on the resources of the minerals, lands, forests, and waters.

The average length of human life in different countries varies from less than 25 to more than 50 years. This span of life is increasing wherever sanitary science and preventive medicine are applied. It may be greatly extended.

Our annual mortality from tuberculosis is about 150,000. Stopping three-fourths of the loss of life from this cause and from typhoid and other prevalent and preventable diseases, would increase our average length of life fifteen years.

There are constantly about 3,000,000 persons seriously ill in the United States, of whom 500,000 are consumptives. More than half this illness is preventable.

If we count the value of each life lost at only $1,700, and reckon the average earning lost by illness as $700 a year for grown men, we find that the economic gain from mitigation of preventable disease in the United States would exceed $1,500,000,000 a year. This gain, or the lengthening and strengthening of life which it measures, can be had through medical investigation and practice, school and factory hygiene, restriction of labor by women and children, the education of the people in both public and private hygiene and through improving the efficency of our health service, municipal, State, and national.

The permanent welfare of the nation demands that its natural resources be conserved by proper use. To this end the States and the nation can do much by legislation and example. By far the greater part of these resources is in private hands. Private ownership of natural resources is a public trust; they should be administered in the interests of the people as a whole The States and the nation should lead rather than follow in the conservative and efficient use of property under their immediate control. But their first duty is to gather and distribute a knowledge of our natural resources and of the means necessary to insure their use and conservation, to impress the body of the people with the great importance of the duty, and to promote the coöperation of all. No agency, State, Federal, corporate, or private, can do the work alone.

6
40°
7
50°
A
B
C
D
40°
30°
20°
10°
Anapa
NORTH CAUCASIA
CAUCASUS MTS.
Mt. Elbruz
18,526
CASPIAN SEA
Poti
Batum
Tiflis
TRANS CAUCASIA
Baku
Sinub
Samsun
Kereson
Angora
ARMENIA
Mt. Ararat
16,916
Araxes
Lenkoran
Van
Enzeli
Tabriz
Mersina
Urfa
Aleppo
Antioch
Lataka
Hamah
Teheran
MESOPOTAMIA
Euphrates
Tigris
Larnaka
Tripoli
Beirut
Damascus
Bagdad
PERSIA
Acre
Haifa
Syrian Desert
Deraa
Ispahan
Jaffa
Jerusalem
Amman
Mshatta
Dead Sea
Katrene
Skaka
El Djof
Nefud Desert
Busra
Petra
Maan
El Akabah
Batnel Ghrul
Kalaat-i-Mudeverre
Zatvel Haj
Tehuk
Kelaat-i-Akhdar
el Muadhem
Teima
Dar el Hamra
Medain Salih
el Ula
Hedie
Aneyzah
El Kuffa
Medjma'a
Sadik
Koweit
Persian Gulf
Abushehr
BAHREIN Is.
EL HEDJAZ
NEJD
Charfa
El Hauta
Medina
Ras Benas
E. Sefine
Sherm Rabigh
Desert of Robael Khal
Dehna
Mecca
Jiddah
Ras Ka'war
Port Sudan
Abu Hamed
Suakin
Tokar
Thamiam
Ras Kasar
Berber
Shendi
Gos Regeb
Massaua
Asmara
Kassala
El Fasher
Zula
Hamfilah
Sana
Sawa
Shibam
Terim
HADRAMAUT
Wady Medina
Tomat
Sennar
Adua
Ed
Aden (Brit.)
TO INDIA AND THE FAR EAST
Gondar
Antalo
Assab
Gulf of Aden
Debra Tabor
Tajura
Obock
Bander Jinal
Rosaires
Koraia
Magdala
FRENCH SOMALI COAST
Lasgori
Bosaso
Goajam
Beni-Shongul
Baso
Bulhar
Berbera
Kobbo
Harar
Dire Dawa
Burao
BRITISH
Red Sea
Nile
Blue Nile
Atbara
Khartum
Rahad
Dinder
Abu Hamed
5th Cataract
6th Cataract
Ras Dashan
14,208
L. Tana
Rahad
Dinder
Atbara
Nile
Blue Nile
Red Sea
PEARLS
SUGAR
MYRRH
GUMS
COFFEE
COAL
GOLD
FURS
CEREALS
IVORY
Gulf of Aden
Strait of Gib el Mandeb
Musha Island
Zeila
Guardafui

The National Geographic Magazine Map of AFRICA

Prepared from latest geographical data by GILBERT H. GROSVENOR, Editor.

EXPLANATIONS.

Railroads — Steamship Lines ------ Caravan Routes — Cable Lines ——— Overland Telegraph Lines — Principal Products: RUBBER, Gold Fields, Silver Fields, Diamond Fields

British, Egyptian, French, German, Italian, Portuguese, Spanish, Turkish, Independent Territories and Congo State

Contour lines of Elevations are shown for 500', 1000', 3000' and 15,000' thus ...

All level over 2000' are shaded by raising thus ...

Depression Contours are shown thus ...

SCALE OF STATUTE MILES ALONG THE EQUATOR.

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SIERRA LEONE
Freetown
Pen Sierra Leone
Cape Mount
LIBERIA
Monrovia
Grand Bassa
Sinoe
Cape Palmas
Kundu
Musardu
Koro
Sakala
Kong
Salaga
Bondaku
Mango
Kintampo
Ashanti
Mampon
IVORY COAST
GOLD COAST
TOGO
Accra
Abomey
DAHOMEY
Lagos
Ibadan
Ilorin
Ovo
Abeokuta
Forcados
Akassa
Bight of Benin
Cape Coast Castle
GULF OF GUINEA
ANTWERP TO THE CONGO
LISBON TO MOSSAMEDES
Equator
PRINCE
Santo
ST. THOMA
(Port.)
SPERM WH
ANNOBON I.
(Span.)
SOUTHAMPTON TO CAPE TOWN
HAMBURG TO SWAKOPMUND
CABLE TO CAPE VERDE IS. & EUROPE
ASCENSION I.
(Br.)
ATLANTIC
ST. HELENA
(Br.)

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THE NATIONAL GEOGRAPHIC MAGAZINE

WHERE ROOSEVELT WILL HUNT*

BY SIR HARRY JOHNSTON, G.C.M.G., K.C.B., D.SC. COMBS

LATE SPECIAL COMMISSIONER IN UGANDA, ETC., ETC.

THE history of the exploration of East Central Africa is, of course, of great interest not only to Great Britain, but to the United States, because it was not only Britishers who revealed the features of the geography of this region, but Americans also have left their names among these records of exploration. Among such have been Col. Chaillé Long, Mr Chanler, and Dr Donaldson Smith. Col. Chaillé Long was the first resident in the kingdom of Uganda, and was sent there by General Gordon. He was chief of General Gordon's staff, and is living in Washington at the present time. The great Sir Henry Stanley might perhaps be equally claimed by Great Britain and America.

Joseph Thomson was the first to reach the Victoria Nyanza, coming direct from the east coast of Africa. Previously explorers had approached the Victoria Nyanza by a circuitous route from the south and west in order to avoid the Masai tribes. But Joseph Thomson, who was a man with a wonderful gift for getting on with the natives and winning their liking, managed to be the first of all white men to go right through the Masai belt and reach the Victoria Nyanza from the east. And when he finished his wonderful journey he became the real founder of British East Africa. He died at the age of only thirty-seven, after carrying out some of the most remarkable journeys ever made in Africa—remarkable because he never fired a rifle at a native. I traveled immediately afterwards in some of Thomson's tracks and got on splendidly, because my name was so like his that I was taken for his brother, and I was careful not to undeceive the people.

I imagine that President Roosevelt will make his starting point Mombasa, and that from Mombasa he will probably travel a certain distance on the Uganda Railroad, and then strike off toward the north and see what he can find there in the way of interesting big game.

Before we go up in imagination with him along the routes he may follow, it might be well to realize how this country came to be known by Europeans, and what vestiges remain there of the original pioneers.

ARABS AND PERSIANS CAME THREE THOUSAND YEARS AGO

Lamu is an important place some distance to the north of Mombasa. To

*An address to the National Geographic Society, supplemented by extracts from "The Uganda Protectorate," by Sir Harry Johnston.

Photo from David Fairchild

A GIRL OF MOMBASA

Lamu there came undoubtedly natives from Arabia long before the days of Islam—perhaps three thousand years ago—and in time there followed a large immigration from Persia. A number of Persians left Shiras and Bashis, and found their way to East Africa, in consequence of some internal troubles in Persia at a period in history difficult to fix at this time. Men and women of Lamu show signs in their physiognomy of an intermixture between Persian and negro. When I first visited Lamu in 1884 there were beautiful specimens of ancient pottery to be obtained there, either from the houses of the natives or from old tombs. There were old tombs all around the city, in the masonry or cement of which exquisite Persian plates were fixed. I did not avail myself of the opportunity to get any of these specimens, but people came later who were less scrupulous, and the tombs of Lamu have since been rifled of their pottery and other beautiful examples of ancient art. An examination of the tombs threw very interesting light on the history of East Africa, because they contained a good many examples of Chinese pottery, and even Chinese coins.

Following the Arabs and Persians came the Portuguese. When Vasco da Gama rounded the Cape of Good Hope he traveled rapidly with the aid of the north monsoon, reached the Swahihi coast, and built the commemorative column of Malindi, which exists to this day some distance to the north of Mombasa. The Portuguese held for a time Lamu, and for something like two centuries the port of Mombasa, the fortifications of which remain to this day as a signal example of the wonderful energy of the Portuguese at that period.

The Portuguese were expelled from this country by an Arab uprising in the middle of the eighteenth century. Some of the women whom President Roosevelt will see at Mombasa are rather extensively clothed, compared to the people of the far interior. They also wear nose rings and other ornaments probably borrowed from the Hindus, for there are a great many East Indian settlers at Mombasa and the other Swahihi ports.

The people who inhabit the country in the vicinity of Tana River, north of Mombasa, and thence north through the lands of the Boran Gala, are a very interesting type, obviously not negro, but perhaps more Caucasian; only darkened by some old intermixture with the negro races. They often have European features. Their language is very interesting, because it, together with Lamato and other Hamitic tongues, is related to the language of the ancient Egyptians.

Now we will imagine we have landed at Mombasa and have taken the railroad. The President will have noticed that the coast belt has a very dense vege-

tation, owing to the heavy rainfall. Then he will travel through a more arid country of thorn bushes and Euphorbias, until he reaches a plateau region of plains, mountain ridges, and stream valleys with fine forests.

Then the railway descends into the Great Rift Valley, which is a depression twenty to forty miles broad, extending from the southern part of German East Africa to the Red Sea. It is as though some convulsion of the earth had caused a section of the plateau to slip down about 3,000 feet below the general level.

STREET SCENE IN MOMBASA

There is a system of narrow-gauge tram-lines running along the main roads, with branches running off to every house. Each official keeps his private trolley, in which he is pushed by coolies to and from his daily work. No white man in Mombasa walks if he can possibly avoid doing so. Photo from David Fairchild.

On looking at a relief map of northeast Africa it almost suggests the idea that nature had been considering whether she would not cut off another slice of Africa in addition to Madagascar. Madagascar may have been originally separated from Africa in that way. In this curious depression of the "Rift Valley" is a series of lakes, salt in some instances and fresh in others. Particularly noteworthy is a salt lake named Lake Hannington, after a missionary bishop murdered by the natives. (This commemoration was rather inappropriate because he was killed at a distance of nearly four hundred miles from this place.) Lake Hannington is visited at the present day by tourists who come to see the great number of flamingoes which make their home here.

A WONDERFUL COLONY OF FLAMINGOES

On Lake Hannington it is no exaggeration to say that there must be close upon a million flamingoes. These birds are mainly collected around the northern end of the lake and on the submerged banks which break up the deep blue-green of its still surface. The shores where they cluster, and these banks in the middle of the lake where they are above the water's edge, are dazzling white with the birds' guano. These flamingoes breed on a flat plain of mud about a mile broad at the north end of Lake Hannington, where their nests, in the form of little mounds of mud with feathers plastered on the hollowed top, appear like innumerable mole-hills.

The birds, having hitherto been absolutely unmolested by man, are quite tame. They belong to a rosy species (*Phœniconais minor*) which is slightly smaller than the Mediterranean flamingo, but exquisitely beautiful in plumage. The adult bird has a body and neck of rosy pink, the color of sunset clouds. The beak is scarlet and purple; the legs are deep rose-pink inclining to scarlet. Underneath the black-pinioned wings the larger feathers are scarlet-crimson, while beautiful crimson crescents tip the tertiaries and wing-coverts on the upper surface of the wings. Apparently the mature plumage is not reached until the birds are about three years old. The younger flamingoes very soon attain the

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A BELLE OF MOMBASA WITH HER PET DEER

She paints circles on her cheeks and dyes her hands purple, and is a recognized model of feminine stylishness. Antelope steak is a favorite dish in this region, but this particular animal is a treasured favorite, safe from the hunter's rifle.

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COLONEL BAST AND HIS MIXED SUDANESE AND MASAI TROOPS IN FRONT OF THE GERMAN FORT AT MOSHI, KILIMANJARO

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MASAI MEN RESTING WHILE THEIR WIVES BUILD A NEW VILLAGE

Note the quantities of metal bracelets and necklaces worn by the women. The women generally die of over-work and old age before they are forty

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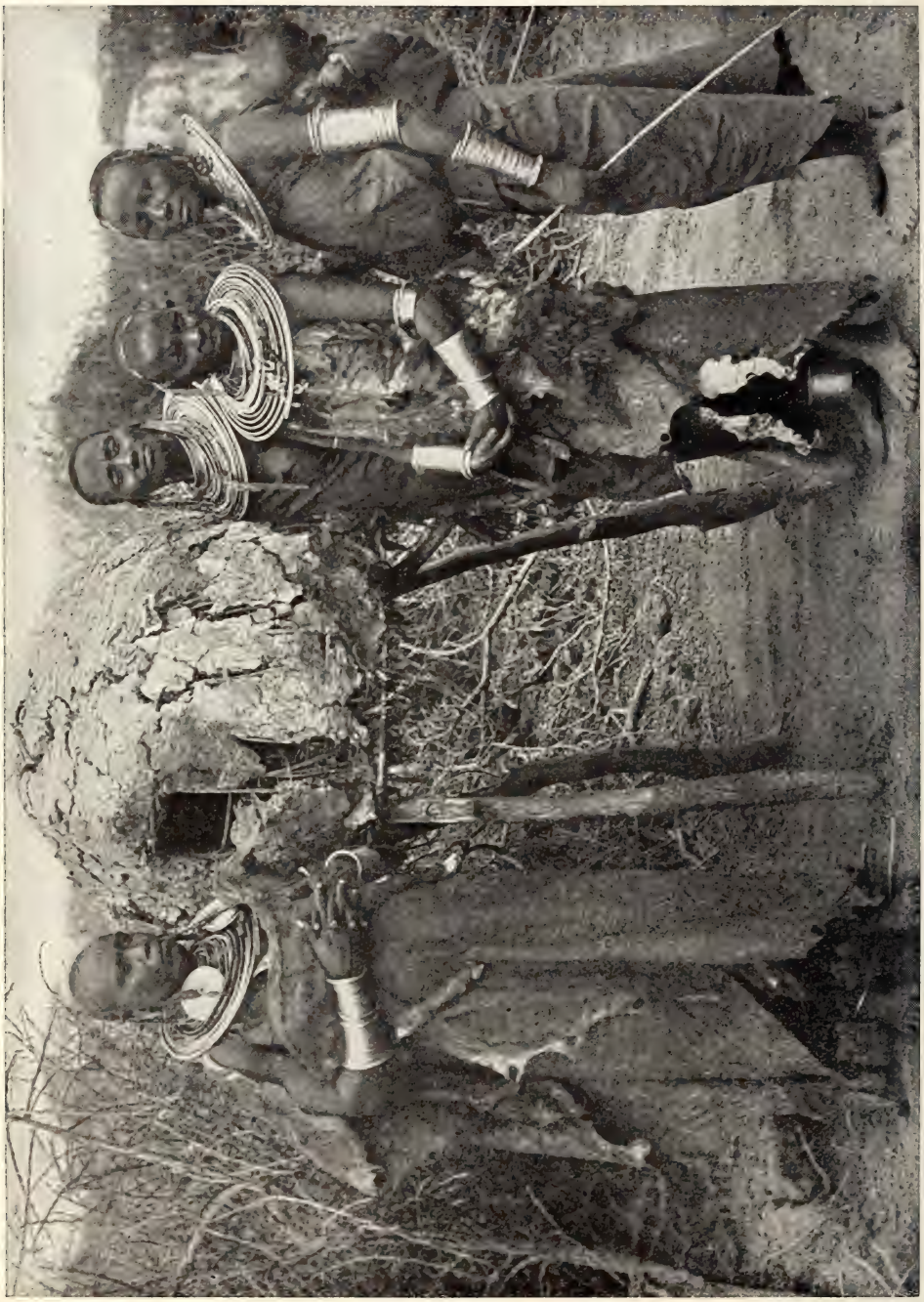
A MASAI SETTLEMENT (SEE PAGE 218)



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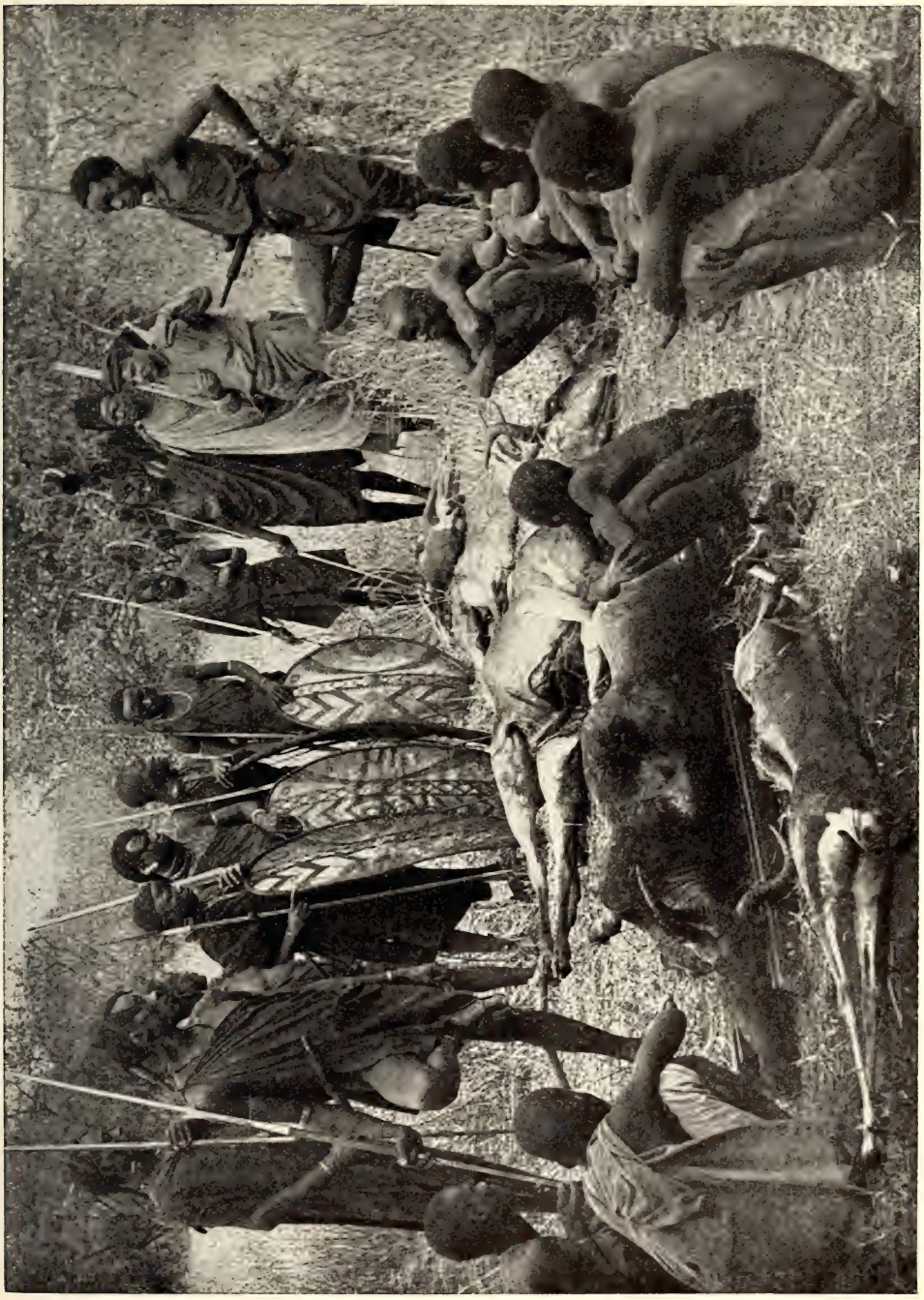
A MASAI AND HIS WIVES



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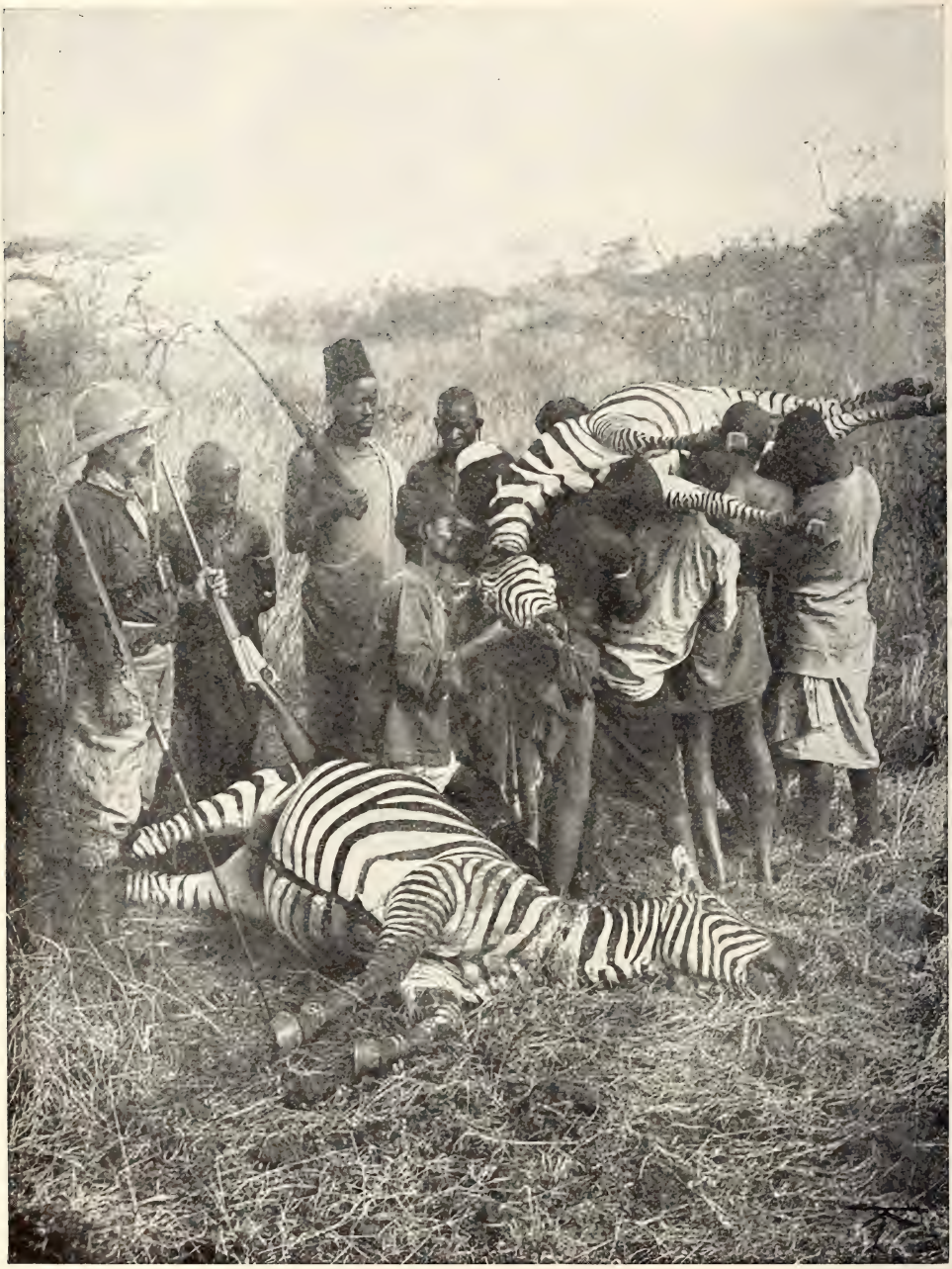
A HUNTING SCENE IN EAST AFRICA



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IN THE GREAT RIFT VALLEY OF EAST AFRICA (SEE PAGE 209)

same size as the rosy adults, but their plumage when they are full grown is first gray-white and then the color of a pale tea-rose before it attains its full sunset glory.

On the north coast of the lake the belt of flamingoes must be nearly a mile broad from the edge of the lake outwards. Seen from above, this mass of birds on its shoreward side is gray-white, then becomes white in the middle, and has a lakeward ring of the most exquisite rose-pink, the reason being that the birds on the outer edge of the semicircle are the young ones, while those farthest out into the lake are the oldest. It is not easy to make the birds take to flight. When they do so suddenly and the shallow water is stirred, the stench which arises is sickening.

The noise of these birds can be heard from nearly a mile distant. The kronk-kronk-kronk of the million, mingled with hissings and squitterings and splashings and the swish-swish-swish of those who are starting on flight, combine to make a tumult of sound in the presence of which one has to shout to one's companions in order to be heard. It is curious to watch the ungainly motions of these birds when they wish to rise in the air. Their flight has to be preceded by an absurd gallop through the mud before they can lift themselves on their wings. When I arrived at Lake Hannington they were so tame that I was able to go as far as I could wade in the water with my camera and photograph them at quite a short distance.

QUEER HABITS OF THE NATIVES

The human inhabitants of this part of East Africa mainly belong to the fine, handsome Masai race and the peoples of Nandi and Suk stock (closely allied in racial origin to the Masai), while in the coast regions bordering the Victoria Nyanza there are a few Nilotic and Bantu negroes.

The Suk natives of the northern part of the Rift Valley, southwest of Lake Rudolf, wear no clothes, but devote considerable attention to their hair. It is thought an unwomanly thing for the Suk women to have hair on the head. The men, however, encourage the hair to grow. When the father of a family dies his head-hair is divided among his sons, and each one weaves his portion into a *chignon*. In this *chignon* is a hollow bag in which is put all a man's portable possessions that he prizes most—his snuff box, ornaments, etc.

The Karamojo people who dwell to the west of Lake Rudolf do not go in so much for *chignons,* but their favorite ornament is to make a hole through the lower lip and to wear in it the cone of some crystal.

Among the dense forests, the game-haunted wildernesses, and unfrequented plateaux, wanders a mongrel nomad race, the Andorobo, who represent a mixture of Nandi, Masai, and some antecedent negro race of dwarfish, Bushman stock. These Andorobo reproduce in a most striking manner the life which we may suppose to have been led by our far-away ancestors or predecessors in the earliest Stone Ages. They lead, in fact, very much the life that the most primitive types of man led in Great Britain and France in the farback days of big animals, possibly before the coming of the glacial periods. They live entirely by the chase, often consuming the flesh of birds and beasts uncooked. Though they commit considerable devastations among the game of the province, they are a picturesque feature when encountered, and a striking illustration, handed down through the ages, of the life of primitive man not long after he had attained the status of humanity and had acquired a knowledge of the simplest weapons.

THE MASAI PEOPLE

Lake Naivasha, one of the lakes of the Rift Valley, is probably the center of a district where President Roosevelt will spend some time, because there are some very interesting things to be seen and possibly some remarkable animals to be obtained there. The western side of Lake Naivasha has picturesque moun-

tains, which have to be ascended by the Uganda Railway, further north than Lake Naivasha, at considerable difficulty and expense. Here the railroad is carried to an altitude of 8,300 feet before it begins to descend the western slope of the plateau.

Lake Naivasha is almost in the middle of the western Masai country. The dwellings of the cattle-keeping Masai are small flat-roofed structures. The Masai women are scrupulously clothed, originally in dressed skin, but today often in cloth. They are sharply distinguished from their husbands and brothers, who very ostentatiously wear no clothing for purposes of decency. The Masai have attracted a great deal of attention ever since Joseph Thomson, the explorer, together with Dr Fischer (an equally distinguished explorer of German nationality), laid bare to us Masailand. The Masai have been the occasion of terrible havoc throughout East Africa by the attacks they made on all settled peoples. At some unknown period in their racial career a very great part of the Masai decided they would not till the fields any longer, but that they would take away the cattle of other tribes not strong enough to resist them. This is one of the reasons why so many of these beautiful plateaus of the present day are absolutely devoid of human inhabitants except a few European settlers who have come there. It was not that the negroes objected to the climate; they simply wiped one another out. This process has occurred over and over again in many parts of Africa. No one has ever been so cruel to the negro as the negro himself. The Masai are now great cultivators.

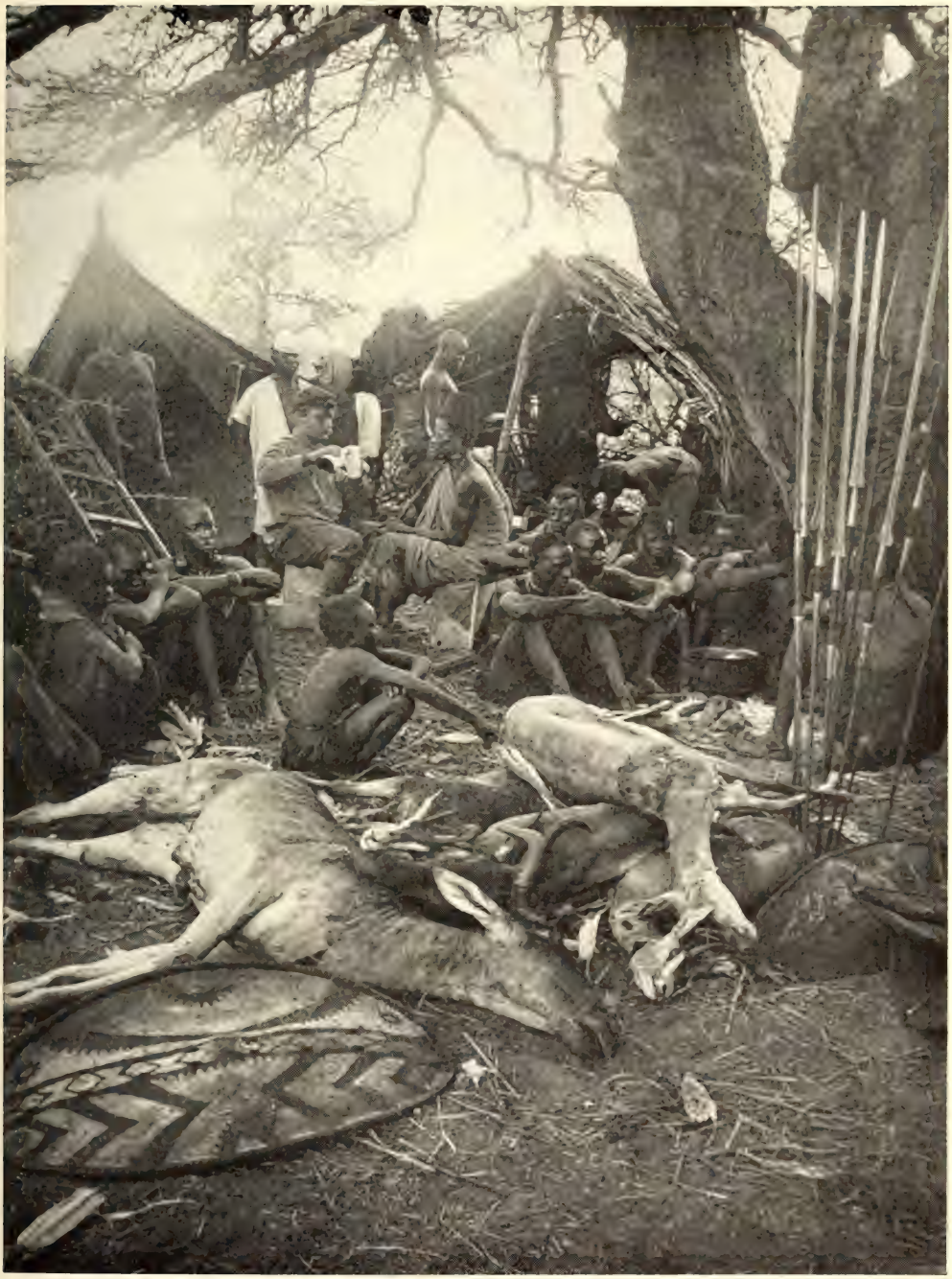
Their towns are surrounded by belts of tall trees, mainly acacias, some of which must be considerably over a hundred feet in height, with green boughs and trunks and ever-present flaky films of pinnated foliage. In the rainy time of the year these trees are loaded with tiny golden balls of flowers, like tassels of floss silk, which exhale a most delicious perfume of honey. In the plains between the villages Grevy's zebra and a few oryx antelopes scamper about, while golden and black jackals hunt for small prey in broad daylight, with a constant whimpering.

Enormous baboons sit in the branches of the huge trees ready to rifle the native crops at the least lack of vigilance on the part of the boy guardians. Large herds of cattle and troops of isabella-colored donkeys, with broad black shoulder-stripes, go out in the morning to graze, and return through a faint cloud of dust, which is turned golden by the setting sun in the mellow evening, the cattle lowing and occasionally fighting, the asses kicking, plunging, and biting one another.

THEIR DEAD ARE DEVOURED BY HYENAS

After sunset, as the dusk rapidly thickens into night, forms like misshapen, ghostly wolves will come from no one knows where, and trot about the waste outside the village trees. They are the spotted hyenas, tolerated by the Masai because they are the living sepulchres of their dead relations. When man, woman, or child dies among the Masai, agricultural or pastoral, the corpse is placed on the outskirts of the settlement for the hyenas to devour at nights. The cry of the hyena is not a laugh, as people make out, but a long-drawn falsetto wail ending in a whoop. It sounds exactly like what one might imagine to be the mocking cry of a ghoul; and but for the fact that we now find that the ghoul myth has a very solid human origin (since there are depraved people all over Africa at the present day who have a mania for eating corpse-flesh, and this trait may also have cropped out in pre-Mohammedan days in Arabia and Persia), one might very well imagine that the idea of the ghoul arose from the hyena, as that of the harpy probably did from the vulture.

All these people are alike in their love of blood as an article of food. They periodically bleed their cattle and drink the blood hot, or else mix it with porridge. The women of these tribes do not eat fowls, and neither men nor women eat eggs. As among most negro races, the men feed alone, and the women eat after the men have done.



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RESTING AND FEASTING AFTER A MORNING'S HUNT IN THE JUNGLE

An American sportsman with native guests and servants near the British frontier of German East Africa

AN ANDOROBO

AN ANDOROBO BEAU Photos from C. E. Akeley

Note that the wooden cylinders in the boy's ears have been inserted in the lobes of the ear and are entirely supported by this means (see page 221)

Honey is a most important article of diet of all the natives in this region. In some districts they semi-domesticate the wild bees by placing bark cylinders on trees for them to build in. From honey is made an intoxicating mead. They also make a wine from the sap of the wild date palm. Beer is made from the grain of eleusine and sorghum. As a general rule fermented liquors are never drunk by the young unmarried women or the young men. Both sexes and people of all ages use tobacco in one form or another. The fighting men take snuff, the old married men chew tobacco, and the old women smoke it. The Lumbwa people make tobacco juice by keeping macerated tobacco leaves soaked in water in a goat horn slung round the neck. Closing one nostril with a finger, they tilt the head on one side, and then pour the liquid tobacco juice out of the horn into the other nostril. Both nostrils are then pinched for a few minutes, after which the liquid is allowed to trickle out.

POISONED ARROWS

The nomad Andorobo people, besides killing innumerable colobus monkeys in the dense woods of the Mau and Nandi plateaux (with poisoned arrows), sally out into the plains of the Rift Valley or range over the opposite heights following up the elephant, and attacking and slaying most of the big antelope. They kill the elephant very often by shooting into its leg at close quarters a harpoon with a detachable and strongly poisoned head. The powerful arrow poison used by the Andorobo and Masai is made from the leaves and branches of *Acocanthera schimperi*. The leaves and branches of this small tree are broken up and boiled for about six hours. The liquid is then strained and cleared of the fragments of leaves and bark. They continue to boil the poisoned water until it is thick and viscid, by which time it has a pitch-like appearance. The poison is kept until it is wanted on sheets of bark. After they have finished preparing the poison they carefully rub their hands and bodies free from any trace of it with the fleshy, juicy leaves of a kind of sage.

The poison is always kept high up on the forks of trees out of the reach of children, and the poisoned arrows are never kept in the people's huts, but are stowed away in branches. When a beast has been shot with these arrows, it dies very quickly. The flesh just around the arrowhead is then cut out and thrown away, but all the rest of the beast is eaten and its blood is drunk.

All these peoples use dogs in hunting, and before starting for the chase they are said to give their dogs a drug which makes them fierce. They also catch birds with bird-lime. The Nandi go out in large numbers to hunt, surround a herd of game in a circle, and then approach the animals near enough to kill them with arrows and spears.

The people who inhabit the eastern fringe of the plateau develop the fashion of the earring to a considerable extent. They begin when children to pierce a hole in the lobe of the ear through which they first pass a stick of wood the size of a match. This is increased in thickness until they succeed in stretching the lobe in the course of years into a huge loop. It is interesting to know that in some of the old Egyptian accounts of the Land of Punt (which we take to be somewhere near Somaliland, in northeast Africa), they mentioned people with ears that hung down to their shoulders. Obviously they are describing the people of Somaliland as they existed 3,000 or 4,000 years ago. Some of them have a physiognomy rather similar to the Hamitic people of the north, not altogether negroes.

GRAND SCENERY OF THE RIFT VALLEY

The hills of the termites, or "white ants," are not only familiar in their general outline to all who have visited tropical Africa, but even to the untraveled reader of books describing African exploration. Therefore even the uninitiated would be struck by the extraordinary height and formation of the termite hills round about the Baringo district. This

Photos by Sir Harry Johnston

AN ANDOROBO (SEE PAGE 221)

A NATIVE NEAR MOUNT ELGON

A LENDU WOMAN FROM THE WEST COAST OF ALBERT NYANZA

Photos by C. E. Akeley

ANDOROBO FAMILIES IN THE FORESTS OF MOUNT KENIA

Photo by C. E. Akeley

ON THE ATHI PLAINS

peculiar shape of ant-hill commences as soon as one has descended from the upper part of the Rift Valley to the level of Lake Baringo, and I believe continues northward toward Abyssinia.*

The scenery of the Rift Valley is very grand, especially when seen from above. I have stood at one point near the northwestern edge of the Elgeyo escarpment and looked down a sheer 5,000 feet on to a gleaming river which threaded its way through a lake and numerous pools. Here, coming from the north, begin those splendid forests of conifers (two species of juniper and a yew) so characteristic of this plateau region. Away to the west toward the great blue mass of Elgon, the country is of noble appearance; splendid rolling downs of short rich grass, patches of woodland, acacia forests, and vegetation of more tropical appearance along the valleys of the watercourses. For the most part the downs, over which one's gaze can stretch 50 or 60 miles as they gently slope toward the north or toward Victoria Nyanza, are clothed with soft, silky grass, which takes a pale pink, mauve, gray, or russet sheen as the wind bends the flowering stems before it.

*The celebrated Rift Valley begins in German East Africa at an altitude of about 2,500 feet. It rises in height as it is followed northward till at Lake Navaisha the altitude is 6,300 feet. The general level of the Rift Valley then slowly decreases till at Lake Rudolf it is only 1,200 feet above sealevel, and from this point, with a few occasional upheavals and ridges excepted, it dwindles down to sealevel at the Gulf of Aden. See also page 209.

HERDS OF GIRAFFES

Over this plateau (where the traveler must beware of following any presumed native path, since it is only a cunning device leading up to a game-trap, an oblong pitfall hidden with sticks and cut grass) roam countless wild animals at the present day, and I earnestly pray may continue to roam there, completely protected from the British sportsman and his oft-times insensate ravages. The nomad natives who make these game-pits secure too small a proportion of the antelopes to be taken into much account. Here may be seen large herds of giraffes as one might see cattle peacefully standing about in an English park. These giraffes are the finest development we yet know of the northern form—of that species of giraffe which extends all over northern Central Africa from east to west, with the exception of Somaliland, where a peculiarly colored species is developed. In color the adult males and females become so dark on the upper part of the body that, seen from a distance, they seem to

Photo by C. E. Akeley

NATIVE BEE HIVES NEAR MOUNT KENIA (SEE PAGE 221)

NATIVES CARRYING SUGAR CANE NEAR MOUNT KENIA

Photo by C. E. Akeley

The sugar cane grows very luxuriantly in the regions near Victoria Nyanza or near rivers. The natives never made sugar from it before the arrival of Indians and Europeans. They only chewed the stalk of the cane for its delicious juice

be black or purple with white bellies, and are therefore most striking objects, especially when they stand, as they often do, on the tops of low ant-hills, from which they survey with their keen sight all the surrounding country. When a giraffe is thus poised on a mound like a sentinel he is absolutely rigid, and moves his head so little that the appearance of immobility, coupled with the extraordinary shape—the short body and the enormously long tapering neck—give the traveler the fixed impression that he is looking at an unbranched tree-trunk which has been blasted by lightning or a forest fire.

But giraffes are not the only large game on these glorious downs. Elephants may be seen in great herds close by, but they affect rather more the scattered forest than the open plains. Where you see the giraffes you see also numerous rhinos in couples, male and female, or a female alone with her snub-nosed calf. The rhino looks a purple-black or a whitish-gray as he moves through the long grass, according as the light strikes him.

AMAZING SWARMS OF GAME

It is a glorious sight, say an hour after the sun has risen and the shadows are beginning to shorten, to traverse this grass country and see this zoological garden turned loose. Herds of zebras and Jackson's hartebeest mingle together, and in face of the sunlight become a changing procession of silver and gold, the sleek coat of the zebras in the level sunlight mingling their black stripes and snowy intervals into a uniform silver-gray, while the coats of the hartebeests are simply red-gold. Dotted about on the outskirts of this throng are jet-black cock ostriches with white wings, a white bobtail, and long pink necks. Red and silver jackals slink and snap; grotesque wart-hogs of a dirty gray, with whitish bristles and erect tails terminating in a drooping tassel, scurry before the traveler till they can bolt into some burrow of the ant bear.

Males of the noble waterbuck, strangely like the English red deer, appear at a distance, browsing with their hornless, doe-like females, or gazing at the approaching traveler with head erect and the maned neck and splendid carriage of Landseer's stags. Gray-yellow reedbuck bend their lissom bodies into such a bounding gallop that the spine seems to become concave as the animal's rear is flung high into the air. The dainty *Damiliscus,* or sable antelope, with a coat of red, mauve, black, and yellow satin bordered with cream color, stands at gaze, his coat like watered silk as the sunlight follows the wavy growth of the glistening hair. Once black buffalo would have borne a part in this assemblage, but now, alas! they have all been destroyed by the rinderpest. The eland still lingers in this region, but seems to prefer the scattered woodland to the open plains. Lions and leopards may both be seen frequently in broad daylight, hanging about these herds of game, though apparently causing no dismay to the browsing antelopes.

LIKE AN ENGLISH LANDSCAPE

On the different plateaus between the Victoria Nyanza and the Rift Valley you travel through a beautiful country, with a climate like an English June all the year round, with beautiful forests and land obviously fitted for grain cultivation. There is much country of this style in western East Africa, with no sign of human habitation, all the natives having been exterminated at one time and another by intertribal wars. This land is rapidly being settled by Englishmen, Boers, and possibly a few Italians.

The scenery between 7,000 and 10,000 feet in altitude reminds me so much of the land I live in (the south of England), and the resemblance is not even entirely superficial, because you have there so many familiar wild flowers, not perhaps of the same species as in England, but certainly of the same genus. Of course, to anybody who has been a long way from home in tropical Africa, with the prospects of a tedious 7,000-mile sea voyage between him and home,

it makes one feel sadly happy to see such familiar friends as violets, buttercups, and the like one is familiar with in Europe.

THE COLOBUS MONKEY

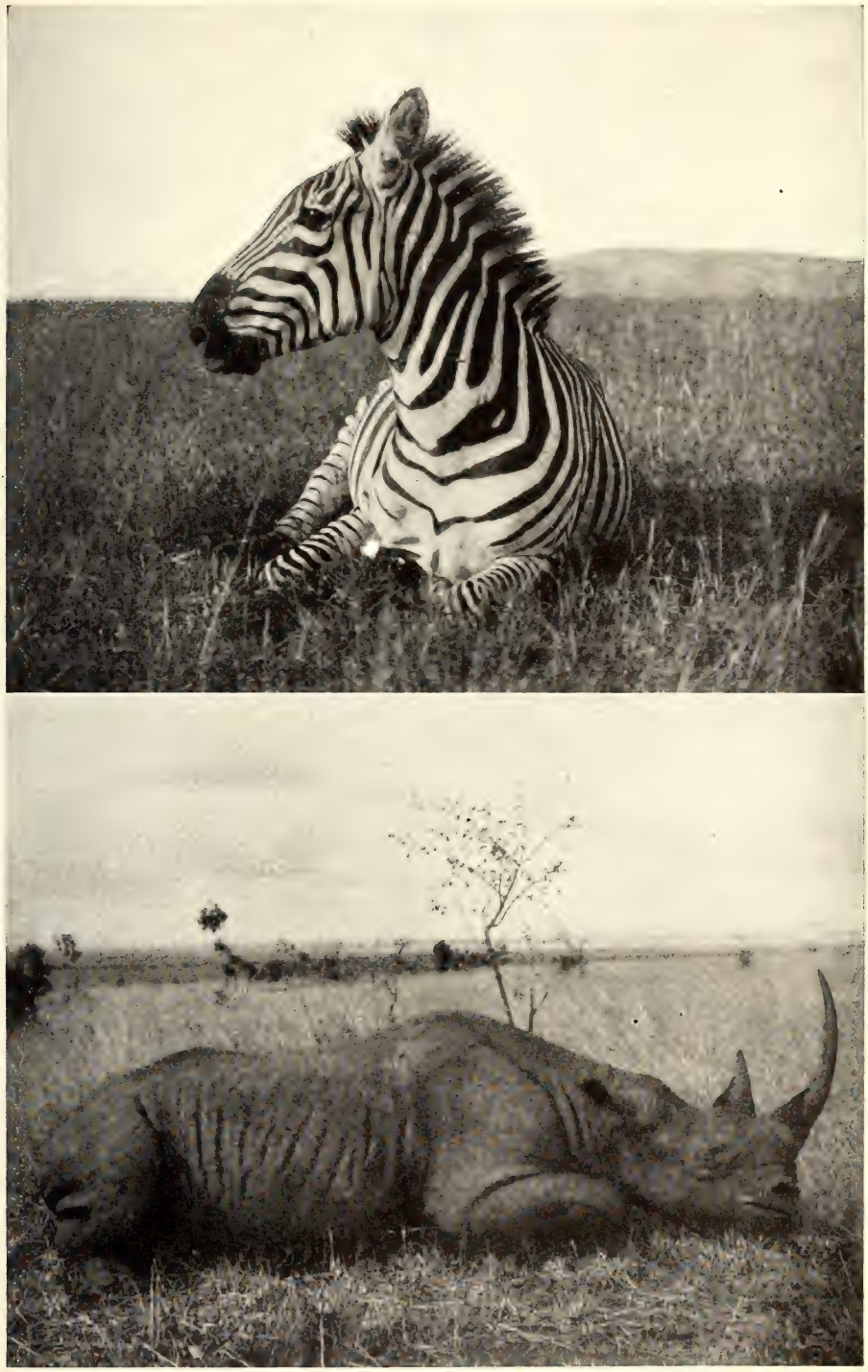
The forests which clothe the eastern descent of the Nandi Plateau are extremely dense, full of magnificent timber, with a mingling of conifers, yews, witch-hazels, and some of the timber and vegetation more characteristic of equatorial regions—a combination, in short, of the tropical forest with the temperate. In these extremely dense woods, which it is impossible for a European to penetrate without a pioneering party to cut a way, but which are nevertheless the hunting ground of the nomad Andorobo, the two most characteristic creatures are the colobus monkey and a large species of tragelaphus antelope, which resembles in some respects the nyala of South Africa and in others the broad-horned tragelaph of the Gaboon. The presence of this tragelaphus is often made known by its peculiar bark, but, although well known to the Andorobo, it has very seldom been seen by Europeans.

But the colobus monkey (which is found throughout the Uganda protectorate and much else of tropical Africa, wherever the forest is dense enough, no matter whether it be cold of climate or always hot) is a far more common sight. The Andorobo who lurk in these forests live mainly on the flesh of this creature, which they shoot from below with poisoned arrows. Having satisfied their hunger on its flesh, they sell the skin, with its long, silky, black and white hair, and its tail, with the immense silky plume at the end, to the Masai or other warlike races, who make it into head-dresses or capes, or else to the European or Swahili trader. As the Andorobo are rapidly bringing the extermination of the colobus within view, its destruction and the sale of its skin are now prohibited, though it will be a long time before the prohibition is understood and obeyed by these wild men of the woods.

LITTLE-KNOWN ANIMALS WHICH PRESIDENT ROOSEVELT MAY FIND

These magnificent forests are remarkable in that they are vestiges of the ancient forest belt of Africa that stretched from sea to sea undoubtedly from the Indian to the Atlantic Oceans; and a remarkable feature at the present day is that many of the forest birds, beasts, spiders, and scorpions of extreme West Africa are more closely allied to the forms of eastern India and Malaysia than they are to those of eastern Africa or western India. In the forests of Mount Kenia and in the Mau, Sotik, and Nandi forests we meet with many creatures that had heretofore been associated only with West Africa in their distribution. In these East African forests you have the magnificent Bongo tragelaph (misnamed "antelope"), which is brilliant orange red with broad white stripes, and also the giant black forest pig, which was only quite recently discovered; and it is probable that if President Roosevelt ransacks these East African forests in thorough-going fashion he may find some other beasts and birds as yet unknown to science.

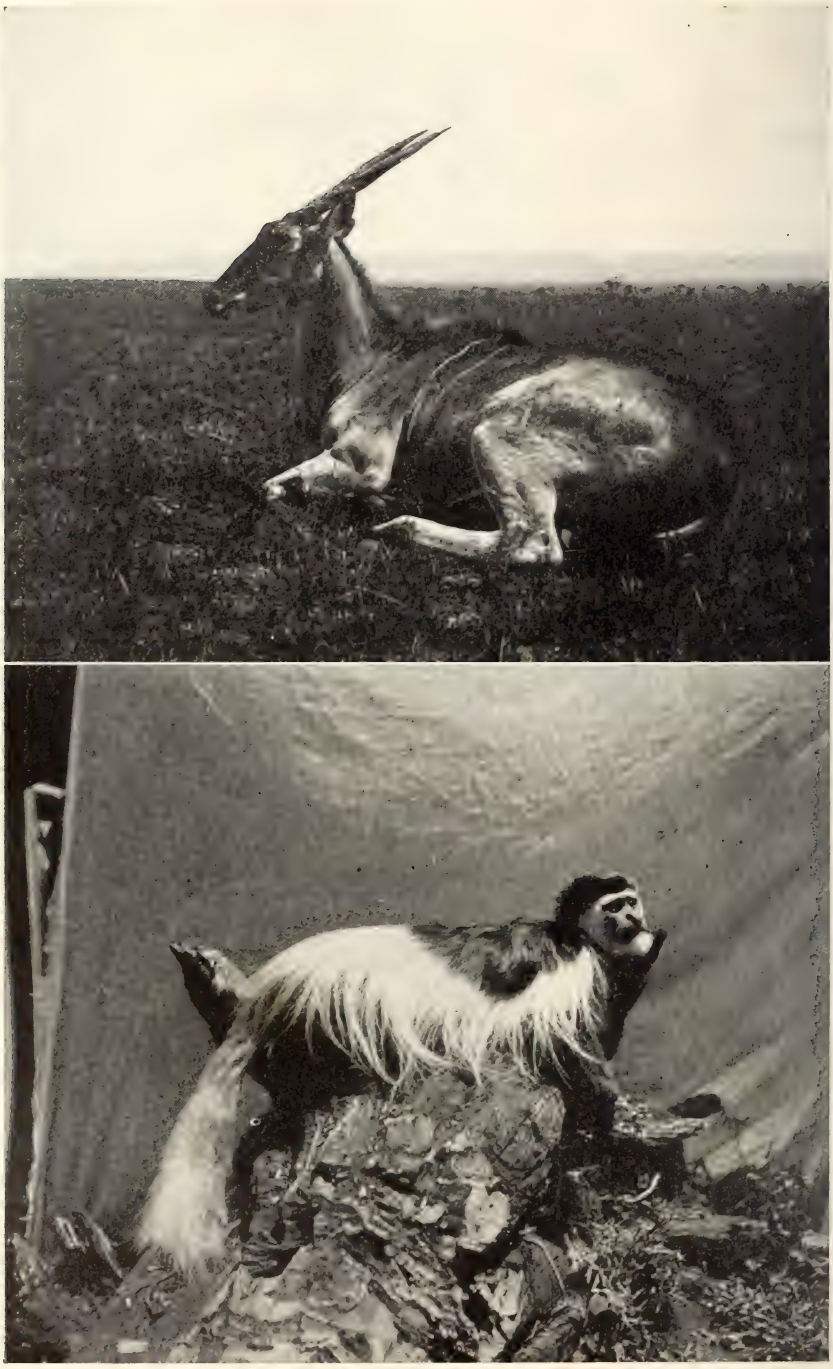
Take, for encouragement, the case of the okapi. That animal was absolutely unknown to us a few years ago. The first hint of it was derived from Stanley. When I was going out to Uganda and East Africa, in 1899, Stanley, who was an old and dear friend of mine, gave me a farewell dinner at his house in London and talked over the things I might discover. He said that there were two creatures he should like to know more about among the animals of the great forests. One seemed to be like a donkey; the natives had told him they used to catch a wild donkey in pitfalls. "It is very strange," said Stanley, "that a donkey should exist there. I also believe I saw a pig bigger than any of the swine known to us at the present day. It was once when I was stumbling along through the forest when a large black pig rushed across my path and nearly knocked me over, but when I had recovered my wits



BURCHELLS ZEBRA ON THE ATHI PLAINS Photos by C. E. Akeley

Zebras may be seen in thousands on the Athi plains and in the neighborhood of Lake Naivasha

A RHINOCEROS (SEE PAGES 233 AND 253)



Photos by C. E. Akeley

COW ELAND ON THE ATHI PLAINS

COLOBUS MONKEY (SEE PAGE 228)

Photos by C. E. Akeley

HIPPOPOTAMUS IN THE RIFT VALLEY (SEE PAGE 245)

IN THE JUNGLE NEAR MOUNT KENIA

Photos by C. E. Akeley

BUFFALO IN THE KENIA PROVINCE

it had escaped into the almost impenetrable forest."

Now this giant pig was actually discovered first of all in Stanley's Ituri forest by N. E. Copeland. Afterward a different species was brought to light in East Africa jointly and simultaneously by a civilian, Mr. Hobley, and an army officer, Captain Meinertzhager. Then it was rediscovered again by Baron Maurice de Rothschild in the Nandi forests. Finally a third species was found by Mr George L. Bates in the Kameruns.

I believe President Roosevelt is anxious to secure for science an undoubted specimen of the white or square-lipped rhinoceros, which has been reported to exist in the northwestern parts of British East Africa. The white rhinoceros for a long time was thought to be confined in its distribution to Africa south of the Zambesi, but where, owing to the somewhat reckless slaughter of wild game in the years before we appreciated the value of them, had become nearly if not quite extinct. A few, however, still linger in Zululand, perhaps in the vicinity of the upper Zambesi. It is interesting now to know that this creature has been found in western Uganda and on the White Nile. There is an intimate connection between the fauna of extreme south Africa and that of the regions of the Nile Valley. And of course there is a still more interesting connection between the fauna of today in eastern Africa and the pliocene and early pleistocene fauna of Europe as far north as southern England, in days when man was already man and hunted these creatures such as you would see them being hunted today by negro hunters. Among the species of rhinoceros inhabiting Europe in the pleistocene were probably representatives of the pointed-lipped form and of the square-lipped species.

PICTURESQUE NATIVES AROUND LAKE VICTORIA

The people inhabiting the settlements around Victoria Nyanza will be probably for a year or so still a source of amusement to the excursionists whom the Uganda railway will bring from the east coast of Africa to the Victoria Nyanza; for they will see before them coal-black, handsomely formed negroes and negresses without a shred of clothing, though with many adornments in the way of hippopotamus teeth, bead necklaces, earrings, and leglets of brass. They are very picturesque as they strut about the streets in their innocent nudity, decked with barbaric ornaments.

The men wear not one earring, but fifteen! Holes are pierced all round the outer edge of the ear, and in these are inserted brass fillets, like melon seeds in shape, to which are attached coarse blue beads of large size and dull appearance. These beads the knowing tourist should collect while they can be purchased, as they are of mysterious origin and great interest. They are not, as he might imagine at first sight, of European manufacture, but have apparently reached this part of the world from Nubia in some very ancient trading intercourse between Egypt and these countries of the upper Nile. As the figures thus exhibited are usually models for a sculptor, this nudity is blameless and not to be discouraged; moreover, it characterizes the most moral people in the Uganda protectorate.

This ebon statuary lives in pretty little villages, which are clusters of straw huts (glistening gold in the sun's rays), encircled with fences of aloes, which have red, green, and white mottled leaves, and beautiful columns and clusters of coral-red stalks and flowers. There are a few shady trees that from their appearance might very well be elms but are not, and some extraordinary euphorbias, which grow upright with the trunk of a respectable tree and burst into uncounted sickly green spidery branches. Herds of parti-colored goats and sheep, and cattle that are black and white and fawn color, diversify these surroundings with their abrupt patches of light and color.

They belong to the better class of Bantu negroes, of that immense group of African peoples which has dominated the whole southern third of Africa from the regions of the White Nile and Victoria

Nyanza to the Upper Congo, Kamerun, Zanzibar, and Zululand. This great Bantu family is noted for the beauty and relative simplicity of their languages. The Bantu languages form a most interesting subject of study, because they are obviously of quite recent origin and constitute a refreshing contrast to the linguistic conditions existing in all that vast Sudan and in western Guinea, where nearly every tribe speaks a language differing radically from that of the next tribe. Once you cross the Bantu border to the south you come to a family of languages almost as closely interrelated in its members as is the Aryan group of Eurasia, so that when once you master one Bantu language it is relatively easy to pass on to another. This gives us extraordinary facilities for entering into direct communication with the people of the southern third of Africa.

THE LARGEST KNOWN VOLCANO IN THE WORLD

The crater of Mount Elgon, on whose slopes it is probable the President will also do some hunting, is about 14,200 feet above sealevel. I believe I am right in saying that Elgon is the largest known volcano in the world. The superficies of the whole mass of Elgon is about equal to the area of Switzerland. It is almost as though Switzerland were concentrated into a single huge mountain mass. The crater is perhaps 30 miles across.

Many caves are found around the circumference of Mount Elgon at an average altitude of 8,000 feet and at the bottom of abrupt terraces. I think the caves were formed originally by the action of water, but undoubtedly they have been enlarged by the work of man. They have been inhabited for a period of unknown length. In fact, there are vague indications that Elgon was a great trading resort in quite ancient times; that between Hamites and negroes Egyptian trade goods coming from the Land of Punt* reached Mount Elgon, where they were exchanged for the products of the forest negroes. We have also evidence that the blue beads that have been dug up there, and which are sought for as great rareties, are of ancient Egyptian origin.

These waterfalls are a very common feature along the terraces of Elgon. They form splendid cascades, and in nearly every case they mask a cave. I am inclined to think that the cave represents the original channel of a stream which has been blocked by lava rock and the stream eventually flowed over its closed cañon.

Passing under a 200-foot cascade of water we find the entrance to a dry, comfortable cavern. Thus the entrance to the cave-man's home is completely masked from the outside by a stream of water. In several cases the entrance to the cave has been defended by a rude stockade, with huge stones piled on top of branching boughs. There are remains in France and other parts of Europe showing that the cave-men of prehistoric times adopted almost the same method of restricting and defending the access to their caverns. One fascinating aspect of the study of backward parts of Africa is like mounting Mr Wells' time machine and traveling backward to vanished phases of European life in the stone age. *Paleolithic* man still lived on in Tasmania till 1871. In negro Africa you can find existing nearly all the stages of culture through which our own ancestors passed in Britain and in other parts of Europe.

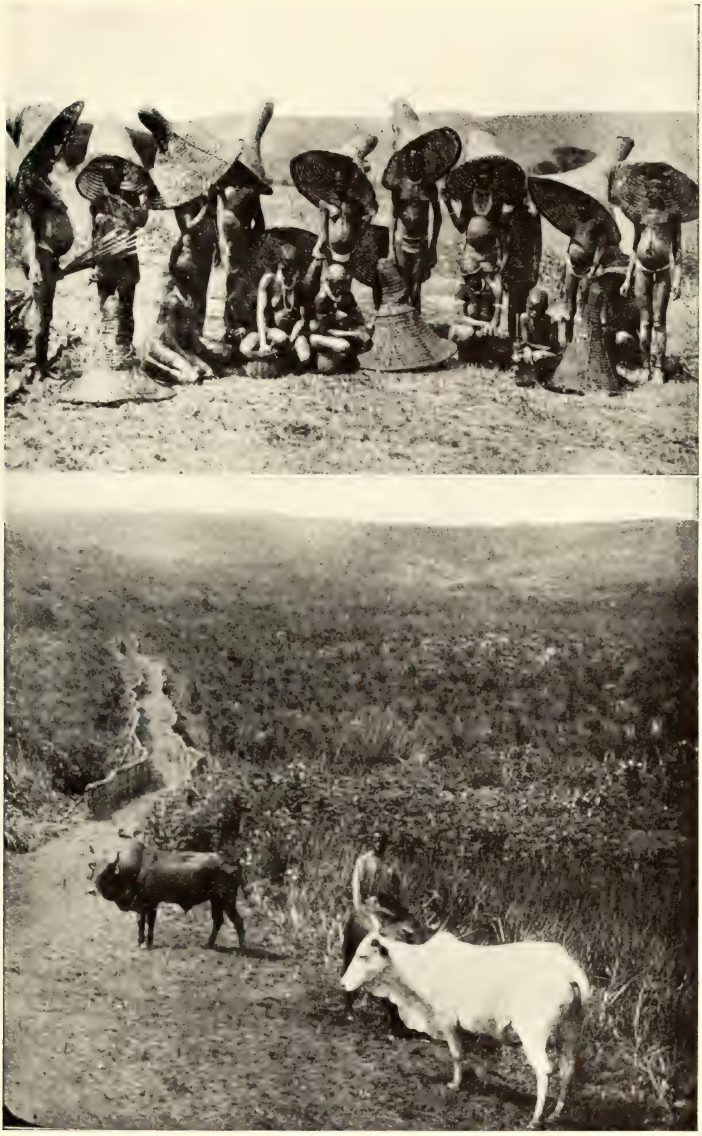
Giant bamboos are found on the East African elevated plateaus above 7,000 feet, growing in some places to about 100 feet in height.

A native beau of this region dresses his hair into little balls with red clay and mutton fat and decorates his ears with white flakes cut from the large Achatina snail shells.

THE REMARKABLE KINGDOM OF UGANDA

The people of Uganda present a very striking contrast after having traveled five hundred miles through a land of absolute nudity and finally reach a people who make it an offense to go about insufficiently clothed.

*Somaliland.



FISHERWOMEN AND THEIR BASKETS: VICTORIA NYANZA

A NATIVE ROAD IN UGANDA (SEE PAGE 243)

"The scenery is different, the vegetation is different, and, most of all, the people are different, from anything elsewhere to be seen in the whole range of Africa. . . . Under a dynastic king, with a parliament and a powerful feudal system, an amiable, clothed, polite, and intelligent race dwell together in an organized monarchy. . . . More than two hundred thousand natives are able to read and write. More than 100,000 have embraced the Christian faith. . . . There is a regular system of native law and tribunals; there is discipline, there is industry, there is culture, there is peace. . . . Submission without servility or loss of self-respect is accorded to constituted authority, . . . and then Uganda

Photos by Dr C. E. Akeley

BOYS DRESSED IN REGALIA INCIDENT TO THEIR FIRST TRIBAL CEREMONY: KENIA PROVINCE

Photo and Copyright, 1909, by Underwood & Underwood, New York

NATIVES READY FOR A CEREMONIAL DANCE IN HONOR OF THE YOUNG MAN IN THE FOREGROUND, WHO HAS, SINGLE HANDED, KILLED A LION WITH A SPEAR

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A SCENE IN THE FOREST OF EAST AFRICA

Photo and Copyright, 1909, by Underwood & Underwood, New York

GIRL FRIENDS IN A VILLAGE OF EAST EQUATORIAL AFRICA

Photo and Copyright, 1909, by Underwood & Underwood, New York

A FOREST SCENE TYPICAL OF THE SLOPES OF MOUNTS KENIA AND RUWENZORI, WHERE PRESIDENT ROOSEVELT WILL HUNT

is from end to end one beautiful garden, where the staple food of the people grows almost without labor, and almost everything else can be grown better and easier than anywhere else.*

The administrative capital of Uganda, where the headquarters of the protectorate administration are established, is remarkable for its lovely scenery. This is situated at Entebbe, on the long, indented peninsula of that name which stretches many arms out into the lake. "Entebbe" means in the native language "a throne." There are lofty green downs on this peninsula, which command a splendid view over the coasts and islands of the northwestern part of the lake. It is round the foot of these downs, on their southern aspect, that the European settlement is built. The eastern side of Entebbe is tropical forest of exceptional magnificence, which has been cleverly transformed by Mr. Alexander Whyte into botanical gardens, some day to become notable for their beauty.

One prominent feature in the landscape of Entebbe, and in fact of much of southern Uganda, is the lofty incense-trees (*Pachy lobus*). These grow to a great height and are perennially covered with a rich green pinnate foliage. The rugose trunk of thick girth sweats a whitish gum, which, scraped off and burnt on hot coals, produces the smoke of fragrant incense. These trees produce at certain seasons of the year enormous quantities of blue-black plums, which are the favorite food of gray parrots, violet plantain-eaters, and the great blue *Corythoeola,* besides monkeys and hornbills. Wherever, therefore, there is one of these trees growing those who live in the neighborhood may enjoy all day long the contemplation of the gorgeous plumage of these birds, the antics and cries of the parrots, and the wild gambols of the monkeys.

THE NATIVE CAPITAL OF UGANDA.

The native capital of Uganda is, perhaps, best styled Mengo, that being the name of the king's quarter. Mengo is like ancient Rome—only much more so—a city of seven hills, as any one living there and obliged to move about knows to his cost. Each suburb or portion of the straggling town of some 77,000 souls is a hill or a hillock in itself, with an ascent or descent so steep as often not to be compassed on horseback. In between these hills or mounds there are bottoms of marsh, or there are marshy streams which slowly percolate through dense vegetation. Yet sections of the town inhabited by the little king and his court, the native gentry, and the common people are clean and picturesque. Reed fences of a kind peculiar to Uganda, which, by the interlacing reeds, exhibit a bold pattern enclose the ground on either side of the broad red road. Behind these reed fences are numerous courtyards in which bananas grow, and at the end of each series of yards is the closely thatched residence of some family or household.

Everything bears a neat, swept-up appearance, and the handsome trees and general richness of vegetation round the dwellings make it a city of gardens. Along some of the roads there must be straight perspectives of one or more miles in length, and the breadth of the avenues has about it something royal and suggestive of a capital. Mission buildings, with cathedrals in brick and stone, or in humbler materials of cane, thatch, and palm poles, rise from three of the great hills.

A MOST HOSPITABLE AND KINDLY PEOPLE.

The people are extremely hospitable. On my journey through the kingdom, the local chiefs had sent out to hundreds of their people, and each came in bearing at least a bunch of bananas. Some of the headmen even brought cows, goats, a sheep, or anything that they could think of that would gratify the white man. They are the most naturally cultivated of any of the African natives with whom I came in contact. How they acquired this native civilization is not yet clearly known. A more charming people you could not meet in Africa. Their tact is really remarkable. They would send spies into my camp to find out my tastes

*Winston Churchill, M. P.

and idiosyncrasies. Thus they learned that I was especially fond of tea between five and six o'clock in the afternoon. Then they would say to themselves, "He will start at such and such a time." So they would arrange a resting place near the road, set a table, and lay it with a clean cloth. Then they would have the kettle boiling at the right time, so that just as I reached the top of some hill the tea would be poured out and handed to me in a shady arbor.

THESE PEOPLE ARE RELATED TO THE ANCIENT EGYPTIANS

The aristocracy of the western regions of Uganda, the Bahima, in their features and traditions suggest a far-off affinity with ancient Egypt. They must have penetrated further and further south, and wherever they went they were received as demi-gods by the forest negroes. The actual word for demigod, "spirit," is the same as the appellation of these aristocrats (Bachwezi) at the present day. They have an almost Caucasian profile, but they have acquired typically negro hair. The Bahima are the cause of the hallucination existing fifty or sixty years ago at Zanzibar, that there was a white race living on the Mountains of the Moon.

It was the infusion of this Gala or Hamitic blood into the races of Uganda (which consisted mainly of the ordinary black Negro stock grafted on to a preceding dwarfish race like the Congo Pygmies) that built up dynasties and kingdoms which in comparison with most Negro states were powerful, well organized, and endowed with some degree of indigenous civilization. This infusion raised the peoples of Uganda, and the countries of the west coast of the Victoria Nyanza to a position of comfort and refinement a good deal superior to the life led by the naked folk to the east and north of that lake, many of whom were still leading an existence no higher in culture than that of predatory carnivorous man in the lowest Stone Age.

The people of Uganda can recall their kings of a period as far distant as the fifteenth century. The genealogy of the Uganda sovereigns includes thirty-six names (prior to the present king); and if the greater part of the earlier names are not myths, this genealogy, reckoning an average fifteen years' reign to each monarch, would take us back to the middle of the fourteenth century.

Though the Uganda dynasty, no doubt, in its origin is Hamitic and of the same race from which most of the earlier inhabitants of Egypt proceeded, nevertheless, as for several hundred years it has married negro women of the indigenous race, its modern representatives are merely negroes, with larger, clearer eyes, and slightly paler skins. When these kingdoms on the Victoria and Albert Nyanzas flourished, their utmost knowledge of the outer world seems to have been a very vague perception that there was an Abyssinia, or a country to the northeast, which was a powerful kingdom inhabited by people of palish complexion; while in other directions their geography was bounded by the marshes of the Nile, the Congo Forest, Tanganyika, the steppes of Masailand, the cold Plateau of Nandi, and the mass of Mount Elgon.

ATTEMPTS TO TRAIN A WILD ELEPHANT.

One day a baby elephant was presented to me by an Uganda chief. It is a sad thing to relate, but three men were killed in attempting to capture the first elephant. I had expressed a wish one day for some elephants to experiment with in domestication, and the natives, with their usual desire to please me, were so ardent in their determination to gratify my wish and so determined in their pursuit of the young elephant that the mother elephant knocked over and killed three of them. But finally they succeeded in their object, capturing the calf, and to my great surprise it trotted into camp behind one of the men.

This little creature was at the time only four feet high. In two days it had become perfectly tame, and would follow a human being as readily as his own

mother. It was easy enough to feed him with milk, because all that was required was a bottle with a long neck. This bottle was filled with cow's milk diluted with water, and poured down the elephant's throat. Soon all that one had to do was to place the neck of the bottle in the elephant's mouth, and the intelligent creature wound its trunk around the neck of the bottle, tilted it up, and absorbed the contents. For several weeks the elephant throve and became a most delightful pet. It would allow any one to ride on its back, and seemed to take pleasure and amusement in this exercise. It would find its way through diverse passages into my sitting-room, not upsetting or injuring anything, but deftly smelling and examining objects of curiosity with its trunk.

At the same time we had in captivity a young zebra, which was also to be the pioneer of a domesticated striped horse. These two orphans, the elephant and the zebra, became greatly attached to each other, though perhaps there was more enthusiastic affection on the part of the elephant, the zebra at times getting a little bored with constant embraces. Alas and alack! both elephant and zebra died eventually from the unwholesomeness, to them, of cow's milk.

Several other elephants of the same age—that is to say, about four to six months old—were delivered into my hands, but all eventually died. Cow's milk appears to give these creatures eventually an incurable diarrhea, while all attempts at that early age to substitute for milk farinaceous substances have also resulted in a similar disease. I do not say that it is impossible to rear young elephants by hand for we have not made a sufficient number of experiments, but it is very difficult. I therefore favor the plan of attempting to catch elephants of perhaps a year old, at which age they do not require milk as an exclusive diet. One specimen of this age was caught and was readily tamed, and for aught I know is still alive in captivity. (See also page 252.)

GIGANTIC PAPYRUS.

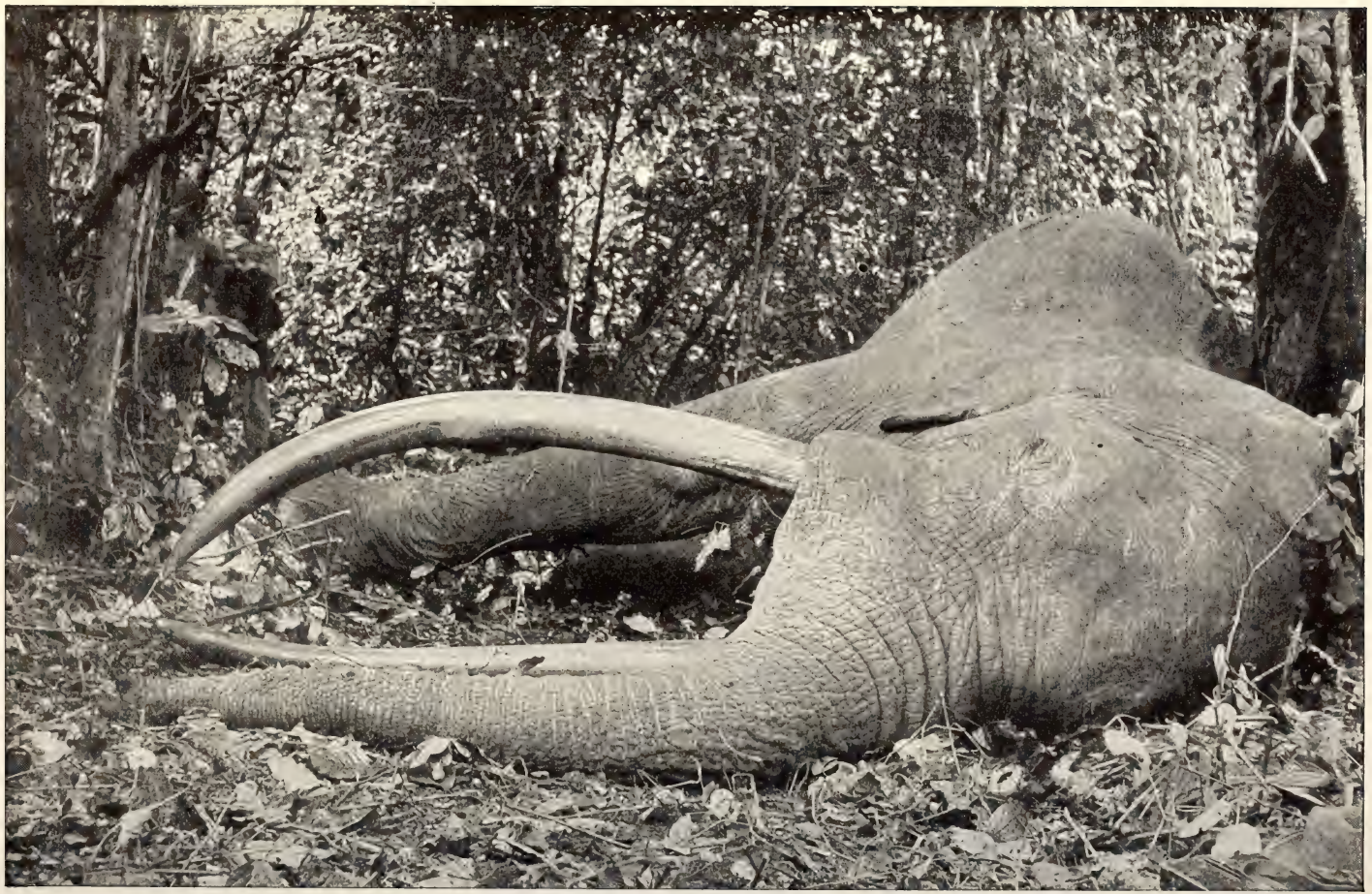
There is a remarkable similarity about all the landscapes in Uganda. There are rolling, green downs rising in places almost into the mountains, and every valley in between is a marsh. This marsh is often concealed by splendid tropical forest. Sometimes, however, it is open to the sky, and the water is hidden from sight by dense-growing papyrus.

The broad native roads make as straight as possible for their mark, like the roads of the Romans, and, to the tired traveler, seem to pick out preferentially the highest and steepest hills, which they ascend perpendicularly and without compromise.

The road is as broad as an English country road, quite different from the ordinary African path (which is barely the breadth of the space occupied by men walking in single life). On either side of the road the grass grows high, perhaps to heights of seven or eight feet, but it is interspersed with gayer-flowering plants and shrubs. The road ascends a steep hill through this country of luxuriant grass. The hilltop reached and the descent begun, the traveler sees before him a broad marsh in the valley below. The descent to this marsh is possibly so abrupt that it is deemed wiser to get off the horse or mule and leave that beast to slither down sideways.

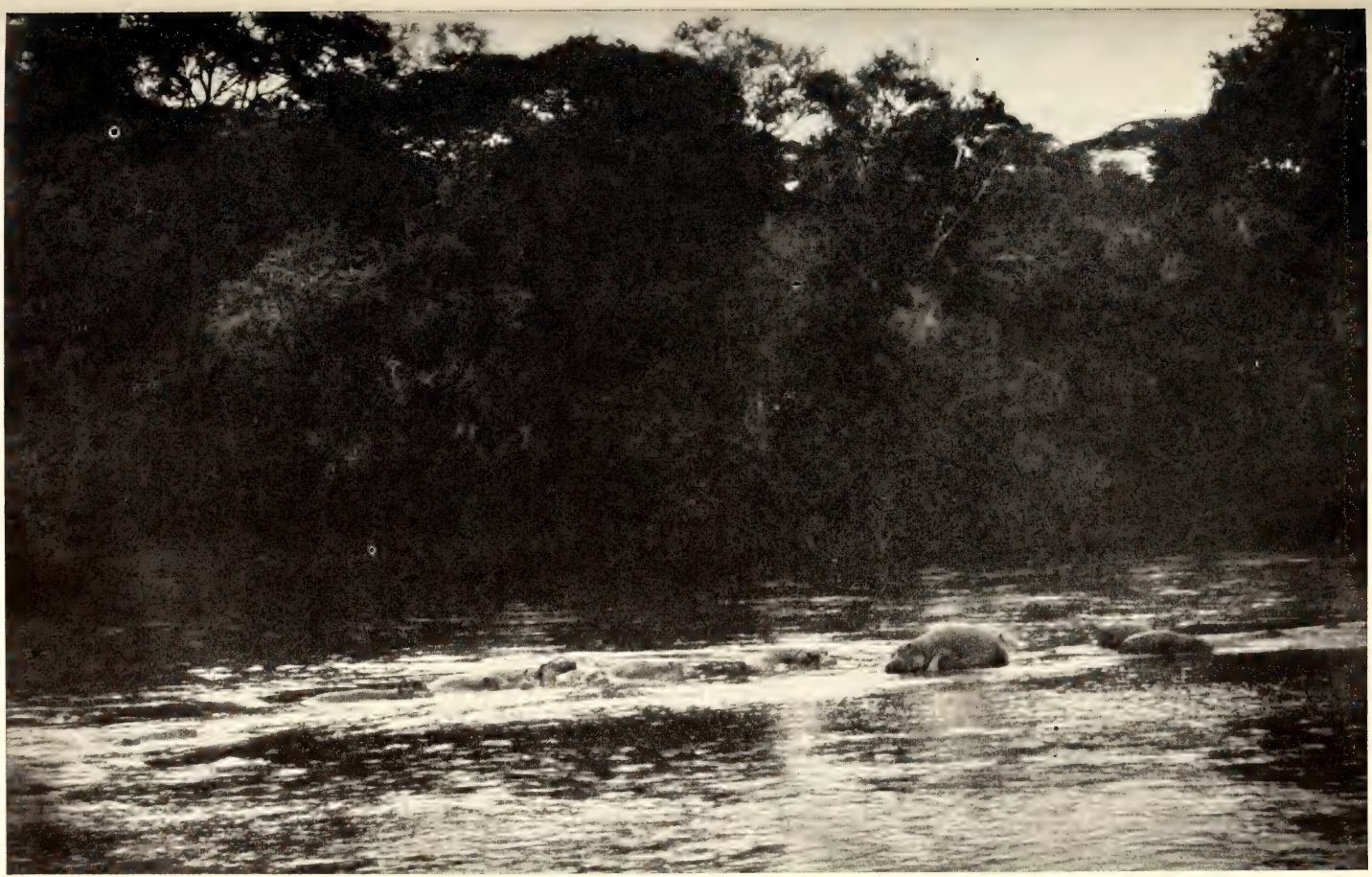
Looking on either side as the marsh is being crossed, the traveler will notice first of all the gigantic papyrus, which may be growing as high as fifteen feet above the water and interspersed amongst papyrus roots are quantities of fern, of amaranth, or "love-lies-a-bleeding," and the gorgeous red-purple *Dissotis* flowers, a yellow composite like a malformed daisy, and large masses of pink or lavender-colored *Pentas*. There are also sages and mints which smell strongly of peppermint, and a rather handsome plant with large white bracts and small mauve flowers.

In and out of this marsh vegetation flit charming little finches of the waxbill



MRS AKELEY'S LARGEST ELEPHANT, KILLED IN THE FORESTS OF MOUNT KENIA

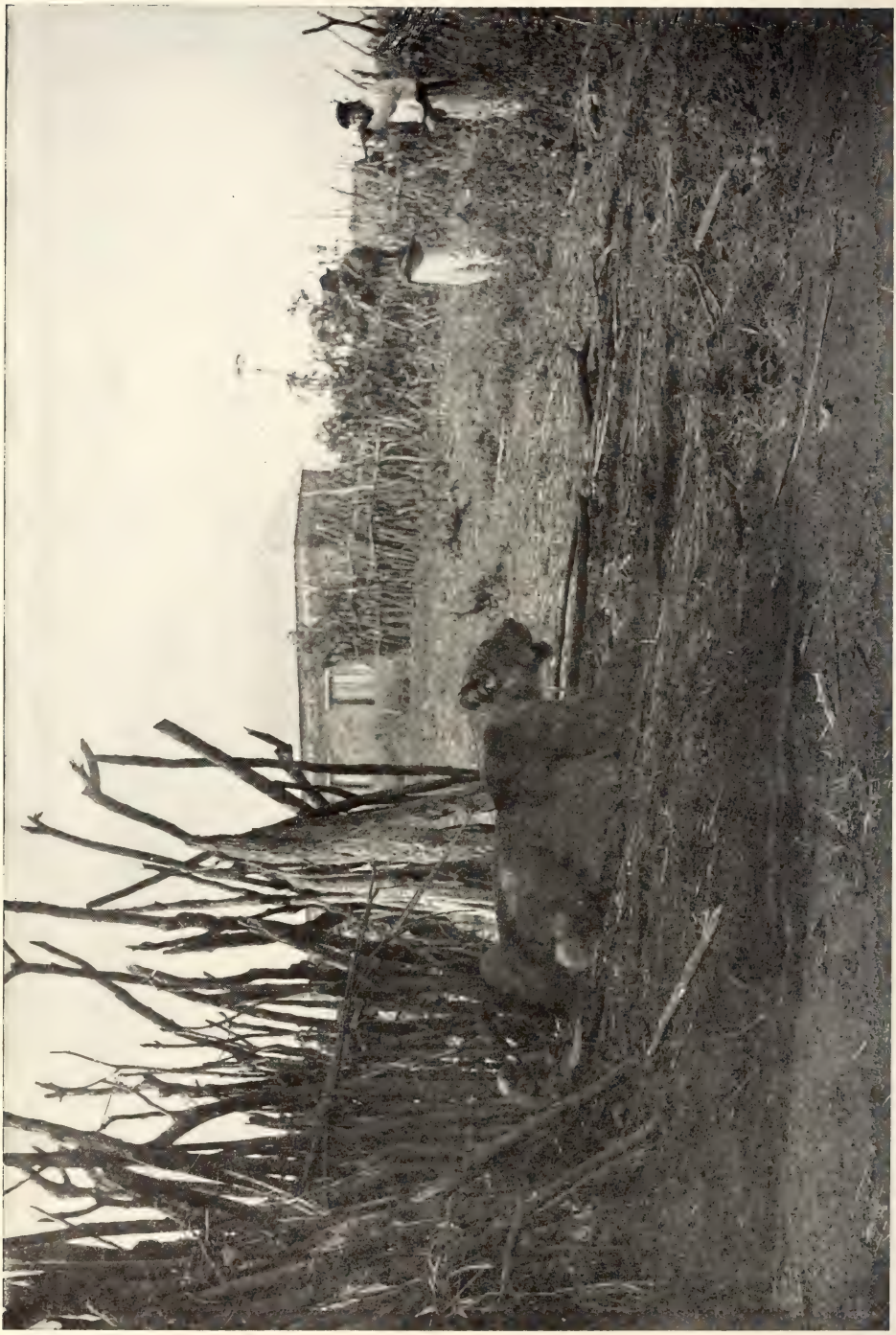
Height, 11 feet 2 inches; tusks, 8 feet 10 inches long; circumference, 19½ inches; weight of tusks, 112 and 115 pounds (see pages 242 and 252)



HIPPOPOTAMI DISPORTING IN A RIVER OF BRITISH EAST AFRICA

Photo by Dr C. E. Akeley

The common hippopotamus is still found in every river with water enough to cover his recumbent body, and in nearly every lake or marsh in the Uganda Protectorate. The animal is very dangerous to navigation at the north end of Lake Albert and on the Upper Nile. He is consequently not much protected by the game regulations (purposely), as there is no immediate danger of his becoming extinct, for in the vast marshes he will be preserved from the white man's rifle, and will be out of the way of steamer routes. See page 267.



A LIONESS TRAPPED IN BRITISH EAST AFRICA (SEE PAGE 271)

type. One of them is particularly beautiful, with a body of black, white, and dove color and a crimson back. The next ascent of the inevitable hill which succeeds the marsh may lead one through a more wooded country, where, among many other flowering shrubs, grows a species of mallow (*Abutilon*), with blush-pink flowers in clusters, like dog-roses in general appearance.

The forests and marshes of Uganda abound in remarkable monkeys and brilliantly-colored birds to a degree not common elsewhere in tropical Africa; but the Kingdom of Uganda, as may be imagined from its relatively dense population—a population once much thicker than today—has been to a great extent denuded of its big game, and it is unlikely the President will spend much time there.

GORGEOUS DISPLAYS OF FLOWERS

Some of the forest trees of Uganda offer magnificent displays of flowers. There is one, the *Spathodea,* with crimson-scarlet flowers larger than a breakfast cup and not very dissimilar in shape. These flowers grow in bunches like large bouquets, and when in full blossom one of these trees aflame with red light is a magnificent spectacle. Other trees present at certain seasons of the year a uniform mass of lilac-white flowerets, as though they had been powdered from above with a lavender-colored snow.

The india-rubber trees and lianas have white flowers, large and small, with yellow centers exhaling a delicious scent like jasmine, but the blossom of one of these rubber trees is vivid scarlet. The *Lonchocarpus* trees have flowers in color and shape like the *Wistaria;* from the branches of the lofty eriodendrons depend, on thread-like stalks, huge dull crimson flowers composed of innumerable stamens surrounded by thick carmine petals. The *Erythrina* trees on the edge of the forest seldom bear leaves and flowers at the same time. When in a leafless state they break out into a crimson-scarlet efflorescence of dazzling beauty. The *Pterocarpus* trees have large flowers of sulphur-yellow.

Many creepers have blossoms of orange, of greenish-white, pink, and mauve. Some trees or creepers (*Combretum racemosum*) are like the *Bougainvillia,* throwing out wreaths and veils and cascades of the most exquisite mauve or red-violet, where the color is given by bracts, the flower itself being crimson and of small size.

Blue alone appears to be missing from this gamut of color in the forest flowers, though it is frequently present among herbaceous shrubs or plants growing close to the ground, and, so far as the trees are concerned, is often supplied by the beautiful species of turaco that particularly affect the forest, and by large high-flying butterflies.

Whatever may be the case in the Congo basin, where the forests often appear sadly lifeless, the woodlands of Uganda are full of color and noise from the birds, beasts, and insects frequenting them. Monkeys are singularly bold and frequently show themselves. There is the black-white colobus with the long plume-tail which has been already described; there is a large greenish-black *Cercopithecus,* and another species of the same genus which is known as the White-nosed monkey. This is a charming creature of bright colors—chestnut, blue-black, yellow-green, and gray, with a snow-white tip to its nose. I believe its specific name is *rufoviridis.* Bright-colored turacos are even more abundant in these Uganda forests, and there are green and red love-birds, gray parrots with scarlet tails, and the usual barbets, hornbills, shrikes, fly-catchers, bee-eaters, rollers—all of them birds of bright plumage or strange form.

ENORMOUS BUT SLUGGISH PYTHONS AND PUFF-ADDERS

There are other forest creatures that are not harmless sources of gratification to the eye. Lying among the dead leaves on the path may be the dreaded puff-adder, with its beautiful carpet-pattern of pinkish gray, black, lemon-yellow, and slaty blue, and with its awful head containing poison glands more rapidly fatal than those perhaps of any other viper.

Numerous pythons, from fifteen to twenty feet in length (generally disinclined to attack human beings, however), are coiled on the branches of the trees, or hang by their tails like a pendent branch, swaying to and fro in the wind. Their checkered patterns of brown and white are rendered very beautiful sometimes by the bloom of iridescence which imparts rainbow colors into the scales when the skin is new.

The natives think nothing of laying hold of the wild python, who may perhaps have coiled himself up in some hole, and however much the snake hisses and protests, it seldom seems to bite. Yet these snakes could crush a man between their folds, and do crush and devour numbers of sheep and goats. They seem, however, very loath to attack mankind and will allow extraordinary liberties to be taken with them. The vividly-painted puff-adders are as common as the pythons, and although their bite is absolutely deadly, they, too, seem too sluggish to attack unless by some blunder you tread on them and wait to see the consequences.

Therefore the snakes are far less an annoyance or an impediment to the exploration of these forests than the biting ants. These creatures are a veritable plague in moist, hot regions where there is abundant vegetation. I suppose they are sometimes at home and resident in their underground labyrinths, but they are a restless folk, forever seemingly on the line of march. They traverse forest paths in all directions along causeways of their own, worn in the soil by the passage of their thousands.

When you come across one of these armies of ants in motion, on either side of the main stream, which is perhaps only half an inch broad, there may be a couple of feet of biting warriors in a swarming mass on either side of the rapidly marching army of workers carrying pupæ. Sentinels are out far and wide in all directions, and if you pause anywhere within a few feet of this marching body of ants you will very soon feel the consequences in a series of painful nips as though from red-hot pincers. These warrior ants know no fear. They attack any creature which comes near their line of march, burying their powerful mandibles in the flesh, and will then let the head be torn from the body sooner than give way.

THE BANANA GROVES.

A description of Uganda would not be complete without a reference to the banana groves, which, from an agricultural point of view, form the distinguishing feature of this country. The cultivated banana is possibly not native to Africa in its origin. I believe botanists consider that it first diverged from wild forms of Musa in Eastern Asia, and, like all the other food products cultivated by the negro, traveled to tropical Africa from India at some prehistoric period. I, too, held this opinion once, but I cannot indorse it so heartily now, on reflection. I believe there is no record of the banana having been known to the ancient Egyptians.

It would, in any case, be difficult to make a native of today believe that his beloved food substance, which provides him with a mass of nourishing vegetable pulp, with a dessert fruit, with sweet beer and heady spirit, with soap, plates, dishes, napkins, and materials for footbridges, was not always indigeneous to the land he dwells in and of which it has become the distinguishing feature.

THE GORILLA AND OTHER STRANGE ANIMALS

In western Uganda beyond the Semliki River, the traveler can walk with a reasonable degree of comfort between the mighty trunks of the colossal trees, whose foliage at a height of 200 feet above the ground almost completely shuts out the sky. This is said to be the region more favored by the okapi than the districts of dense undergrowth. In the depths of these mysterious forests the natives assert that there are other strange animals besides the okapi. A creature which they described as like a pig, only about six feet

Photo from Bishop Hartzell

A NATIVE VILLAGE IN A BANANA GROVE: UGANDA

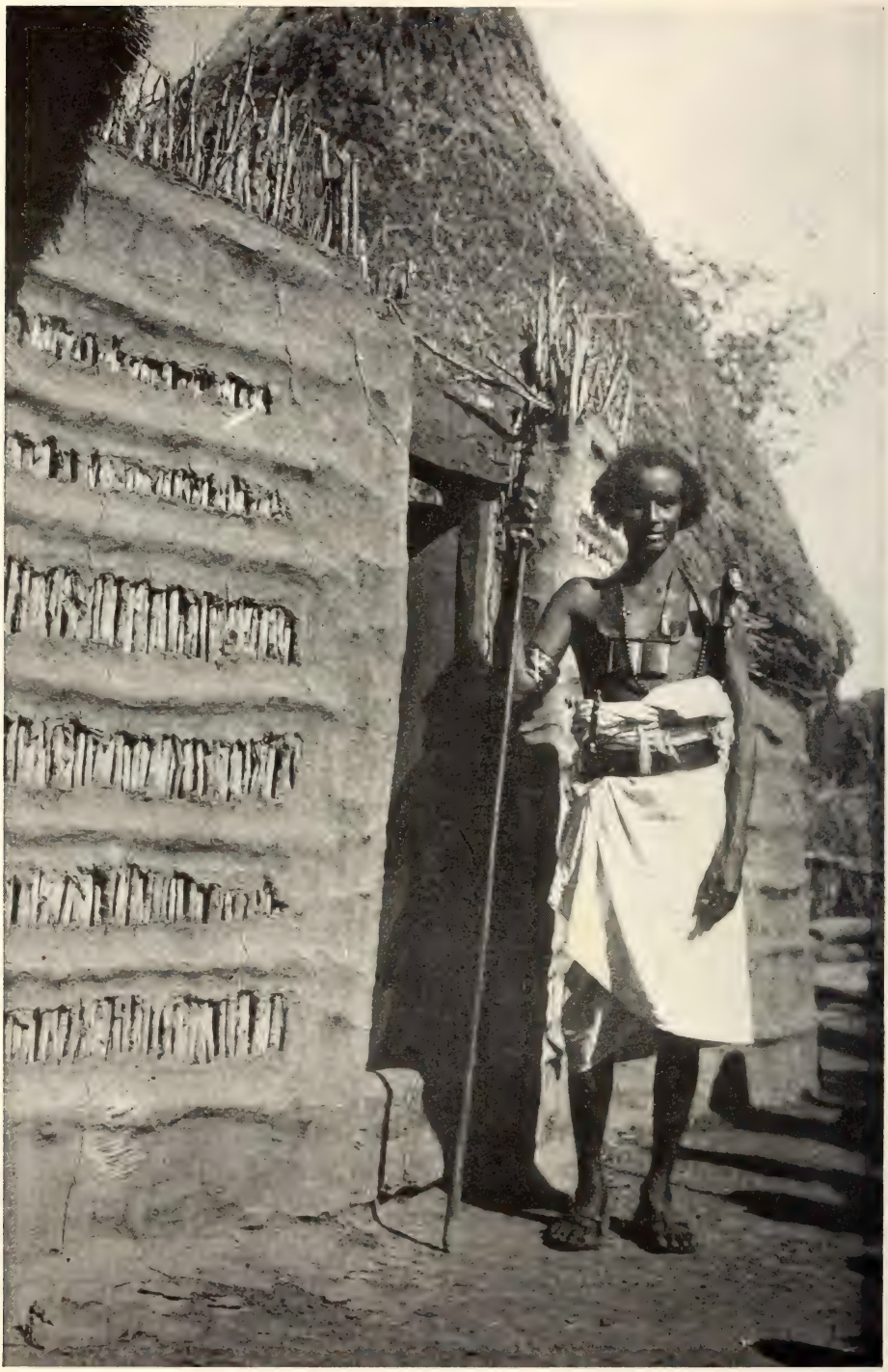


Photo from Gentilucci Italo

A GALA WARRIOR OF HAMITIC STOCK IN ITALIAN SOMALILAND (SEE PAGES 208 AND 242)

Photo from Gentilucci Italo

A GALA WOMAN OF ITALIAN SOMALILAND

long and very stoutly built, may be the little forest-haunting Liberian hippopotamus. There are also stories of a large antelope, with a few white spots or markings, which has very disproportionately small horns in the male.

There is a great deal of talk about a huge manlike ape, but this apparently is nothing more remarkable than the gorilla. The range of the gorilla extends to within a few days' journey of the Semliki River, and specimens which have been killed by natives and photographed by Belgian officers (the photographs were shown to me) are nothing but gorillas, so far as I can judge. The hair of some of these gorillas was quite gray on the head and shoulders, no doubt from age. The leopards in this forest are exceedingly dreaded by the natives, and the stories of their man-eating habits are innumerable.

WILL THE AFRICAN ELEPHANT BECOME EXTINCT?

The elephant inhabits these forests in large numbers, but he appears to frequent with equal relish the savannahs and open grassy plains of the Semliki River and at the south end of Ruwenzori. On our return journey through the Congo forests we halted at the edge of a picturesque gorge, a small river. Though but a small stream, it had in course of time widened for itself a profound gorge that would be large enough for a Hudson and deep enough for a Colorado. Gazing across this gorge one evening; we saw an immense herd of elephants coming toward us, seeming in the distance very black in color against the pale straw-yellow of the dry, short grass of the plains, but with white gleaming tusks, each elephant looking extraordinarily like the Eastern carvings of black ebony elephants with ivory tusks that are to be seen in every Chinese and Japanese collection. When they reached the precipitous descent to the gorge, I thought to see them turn back, but with great ease they slid and scrambled down the steep sides, rushing with shrill trumpetings to the reed beds which marked the invisible watercourse.

We shot two males out of this great herd, having permission to do so from the Congo Free State authorities. When the first rifle shots rang out, it was a touching sight to see the baby elephants run to their mothers (it was one of those large mixed herds that one so often sees with females and young accompanied by young full-grown males), and the mother separate her front legs as widely as possible to receive the little one under the protection of her body, ceasing her fierce trumpetings every few minutes to caress the frightened little one with her trunk. After the shots which laid low these two young males, the frightened animals in their panic tore up and down the gorge through the dense vegetation, not, however, attempting to charge us, though at one time it seemed as though they would run amuck through the camp. These breeding males appear to be quite young for elephants, say twenty to thirty years old), with relatively small (fifty-pound) tusks.

So long as the British government can determinedly enforce the game regulations by a small annual expenditure, and protect female and immature male elephants from being killed by natives or Europeans, there will not be much danger of the African elephant becoming extinct in a territory so large as British East Africa, where Nature has reserved vast marshes and leagues of forest for shelter of this beast. Provided the most religious care—such care is effectual in India—was taken of the females and young, there is no reason why a certain number of male elephants should not be killed yearly by designated agents of the government, and their ivory be sold to merchants as part of the Protectorate revenues. I see no reason whatever now why the female African elephant should not be tamed and used as a transport animal. For this purpose it might eventually prove advisable to import trained Indian females, who might assist in teaching the young captured Africans. (See also page 242.)

If after many years of trial the African elephant is pronounced to be hopeless as a domestic animal (and it should

be remembered that most male African elephants in captivity have shown themselves to be hopelessly savage), then at least for its magnificent ivory the creature is worth preserving as an asset to the state. If the Indian elephant shows himself to be more docile than the African elephant, it must be remembered, on the other hand, that he is of very little value for his ivory.

THE MOST DREADED OF AFRICAN BEASTS

I am afraid that blustering creature, the rhinoceros, can be turned to no useful purpose in the future of Africa, but he is such a grotesque survival from the great mammalian epoch that he should be steadily preserved from extinction. The rhinoceros, however, is a handful, to use a colloquialism. All along the route of the Uganda Railway game is being carefully protected, with the agreeable result that antelopes, zebras, and ostriches graze close to the line, as fearless of man as if they were in an English park. Much the same condition may be observed in parts of the Protectorate off the beaten track, where British sportsmen have not had an opportunity to harry and destroy.

But in all these countries the rhinoceros is not tamed by this tolerance, but is apt to become a dangerous nuisance by charging at all and everything at a moment's notice when it is playful or out of temper. Thus among a people like the Masai it is much dreaded. The Masai do not eat, and therefore do not kill, game. They fear no wild beast but the rhinoceros, because all other creatures, if they are let alone, seem to experience, as a rule, no desire to attack human beings.

The rhinoceros, however, makes absolutely unprovoked charges and occasionally gores a man before he has time to get out of the way. Fortunately these huge beasts are very stupid and very blind. They probably can see little or nothing with any clearness that is ten yards away from them. They are guided entirely by their sense of smell, which, however, is extraordinarily keen.

The rhinoceros of which a picture is here given (page 229) is the ordinary pointed-lipped, black rhinoceros of Africa, which ranges, or used to range, from Cape Colony to Abyssinia and Nubia, and thence, perhaps, across Africa westward to Lake Chad and Eastern Nigeria. So far as I am aware, the rhinoceros has not been found to exist in Africa west of the Central Niger, if, indeed, it gets much farther west than Lake Chad.* This is curious, if true, because the other big beasts of the African fauna, though, like the rhinoceros, they mostly avoid the Congo and West African forests, stretch in their distribution right across Africa, from Abyssinia to Senegal. The two exceptions, however, to this rule seem to be the zebra and the rhinoceros. Not infrequently the East Africa rhinoceroses produce horns of extraordinary length. The record, I believe, is forty-seven inches for the front horn.

THAT PART OF AFRICA WHERE ROOSEVELT WILL HUNT IS PROBABLY THE MOST INTERESTING REGION GEOGRAPHICALLY IN THE WORLD

That portion of the British sphere in East Africa where Roosevelt will hunt contains, within an area of some 150,000 square miles, nearly all the wonders, most of the extremes, the most signal beauties, and some of the horrors of the Dark Continent. Portions of the surface are endowed with the healthiest climate to be found anywhere in tropical Africa, yet there are also some districts of extreme insalubrity.

It offers to the naturalist the most remarkable known forms among the African mammals, birds, fish, butterflies, and earth-worms, one of which is as large as a snake and is colored a brilliant verditer-blue. In this Protectorate there are forests of a tropical luxuriance only to be matched in parts of the Congo Free

*Rhinoceroses swarmed in the countries to the north of Lake Chad in the days of the Romans. This fact was reported by the exploring Roman expedition under Septimus Flaccus, sent south of Fezzan toward Lake Chad at about A. D. 10.

State and in the Kameruns. Probably in no part of Africa are there such vast woods of conifers. There are other districts as hideously desert and void of any form of vegetation as the worst part of the Sahara.

There is the largest continuous area of marsh to be met with in any part of Africa, and perhaps also the most considerable area of tableland and mountains rising continuously above 6,000 feet. Here is reached the highest point on the whole of the African continent; here is the largest lake in Africa, which gives birth to the main branch of the longest river in that continent. There may be seen here perhaps the biggest extinct volcano in the world—Elgon.

Though lying on either side of the Equator, it contains over a hundred square miles of perpetual snow and ice; it also contains a few spots in the relatively low-lying valley of the Nile, where the average daily heat is perhaps higher than in any other part of Africa.

Within the limits of this region are to be found specimens of nearly all the most marked types of African man—Congo pygmies and the low, ape-like types of the Elgon and Semliki forests, the handsome Bahima, who are negroids as much related to the ancient Egyptians as to the average negro, the gigantic Turkana, the wiry, stunted Andorobo, the Appollo-like Masai, the naked Nile tribes, and the scrupulously clothed people of Uganda.

These last again are enthusiastic, casuistic Christians, while other tribes of the Nile province are fanatical Muhammadans. The Bahima are, or were, ardent believers in witchcraft; the Basoga polytheists are burdened with a multiplicity of minor deities, while the Masai and kindred races have practically no religion at all.

Cannibalism lingers in the western corners of the Protectorate, while the natives of other parts are importing tinned apricots or are printing and publishing in their own language summaries of their past history. This is the country of the okapi, the whale-headed stork, the chimpanzee, and the five-horned giraffe, the rhinoceroses with the longest horns, and the elephants with the biggest tusks.

A GREAT BOOM IN EAST AFRICA

Great changes are taking place day by day in British East Africa, owing to the completion of the Uganda railway, which will prove to be, I think, one of the mightiest factors yet introduced into Central Africa for the transformation of a land of complete barbarism to one at any rate attaining to the civilization of settled India. I have had the privilege of seeing this country just in time—just before the advent of the railway changed the Rift Valley, the Nandi Plateau, the Masai countries, from the condition at which they were at the time of Joseph Thomson (1882) to one which day by day becomes increasingly different.

On grassy wastes, where no human being but a slinking Andorobo or a few Masai warriors met the eye; where grazed Grant's gazelle, with his magnificent horns, and the smaller but more gaily colored *Gazella thomsoni;* where hartebeests moved in thousands, zebras in hundreds, ostriches in dozens, and rhinoceroses in couples; where, in fact, everything lay under the condition of Britain some 200,000 years ago; not only do trains puff to and fro (the zebras and antelopes are still there, accepting the locomotives like a friend, since it drives away the lions and ensures the respect of the game laws), but alongside the railways are springing up uncounted hideous habitations of corrugated iron and towns of tents and straw huts.

The solitude of the Rift Valley has gone. Thousands of bearded Indians, hundreds of Europeans and Eurasians, negroes of every African type (from the handsome Somali to the ugly Mudigo), Arabs, and Persians trudge to and fro on foot, ride donkeys, mules, and horses, pack the carriages like herrings, set up booths, and diverge far and wide a hundred miles in each direction from the railway line, trafficking with shy and astonished natives, who had scarcely realized the existence of a world outside their own jungle, for the beef, mutton, fowls, eggs, and vegetable foodstuffs

Photo from Bishop Hartzell

TOWER FROM WHICH THE NATIVES WATCH FOR LIONS: BRITISH EAST AFRICA: NOTE THE "BAIT"

which are to assist in feeding this invasion.

Far away on Baringo natives are extending their irrigation schemes and planting twice as much as they planted before, knowing that there is a market where their spare food can be exchanged for rupees. Farther north still, in the Suk countries, Englishmen, Scotchmen, Goanese, Arabs, Swahilis, and Baluchis are pushing into deserts to buy donkeys, and are trading for ivory which the railway will carry to the coast at a rate less than the cheapest porter caravan.

THE RAILWAY PROTECTS THE GAME

The Nyando Valley, for years without human inhabitants other than the shiftless Andorobo, is filling up with Masai, Swahili, and Nandi immigrants; while for 20 miles at a stretch on the beautiful heights and happy valleys of Mau you are in the presence of an unintentioned European colony, some of which no doubt will melt away with the completion of the railway, but much of which must be the nucleus of the great white colony one may hope to see established on the only land really fitted for its development in equatorial Africa. The Kavirondo, alas! are wearing trousers and "sweaters;" the sacred ibises have left Kisumu, for its swamps are drained. Piers and wharves, hotels and residences in corrugated iron, are springing up at Port Florence, destined, no doubt, to be

a great emporium of trade on the Victoria Nyanza.

So far from leading to the extermination of the game, the railway has actually come to the fore as a means of game preservation. It is really amazing how all the wild animals, except perhaps the lion, have taken to the railway. The big and small game soon realized the fact that they were shot at less from the railway line, and finally not at all, while on the other hand the lions, and perhaps leopards, were perturbed by the noise of the train, and began to shun the line, for, as regards shooting, exceptions were naturally made in their favor. However strict have been the game regulations in force for the protection of game along the line, naturally no restriction has been placed on the shooting of lions, leopards, and hyenas. Whether or not these deductions are fanciful, the plain fact remains to be testified to by any one who now takes a journey on the Uganda Railway that from the window of his carriage he can see as the train crosses certain tracts positive zoological gardens let loose.

AMID THE SNOW PEAKS OF THE EQUATOR*

A Naturalist's Explorations Around Ruwenzori, with an Excursion to the Congo State, and an Account of the Terrible Scourge of Sleeping Sickness

By A. F. R. Wollaston

AFRICA is a land of surprises at every turn, so one is not in the least astonished to find lying alongside of the quay at Port Florence, the end of the Uganda Railway, a perfect little ocean steamship. The white paint and the glistening brass-work, the electric light, and the Indian cook made me think that this was a P. and O. liner eastward-bound rather than a little steamer on a remote lake which fifty years ago no white man had even seen. After the grime of the *Deutsch Ost Afrika* and the discomfort of the Uganda Railway, this was luxury indeed.

The voyage across the lake to Entebbe is not in any way interesting. For a short time the ship is out of sight of land, but generally the north shore is in sight, or some of the innumerable islands that lie along the coast. A few seagulls and cormorants, the only birds that I saw, made it hard to believe that this was not the sea.

RAVAGES OF SLEEPING SICKNESS

One of the most interesting things to be seen in Entebbe at that time was the laboratory of the Royal Commission on Sleeping Sickness, under the charge of Lieutenants Gray and Tulloch, R. A. M. C., where the disease was being studied with a view to discovering its nature and, if possible, some means of treatment. Close at hand was the native hospital, filled with miserable wretches in various stages of the disease. It is sad to have to record that, though a great

*Abstracted from "From Ruwenzori to the Congo," by A. F. R. Wollaston. John Murray, London, 1909.

deal has been done towards checking the spread of sleeping sickness, no means of successfully treating it after infection has taken place has yet been discovered; it is invariably fatal.

The destruction that has been caused in Central Africa by the terrible scourge of sleeping sickness is almost incalculable; enormous areas of the lake-shore and whole archipelagos, where there was a swarming population only a few years ago, have been rendered absolutely desolate by sleeping sickness. I visited a few islands and a strip of shore not far from Entebbe and walked through large grass-grown villages where scattered bones were the only signs of humanity to be seen. It has been computed that more than 200,000 people have died of the disease in Uganda alone during the last seven years, and this is probably well within the mark. Apart from the appalling waste of human life, it involves a very serious loss to the state, which cannot afford to lose a large and thriving population living along its main waterway. One of the effects was to be seen in the increasing difficulty of inducing porters and laborers to remain at Entebbe, where they are afraid of catching the disease.

There is also the not inconceivable possibility of its being turned into an anti-European weapon. An unscrupulous agitator could easily persuade a half-educated people that the white men were responsible for the disease, and that the obvious remedy was to turn them out of the country. Happily only four Europeans have been attacked by sleeping sickness in Uganda, though the number in the Congo Free State is probably a good deal greater. (See also page 273.)

As one travels westward from the Victoria Nyanza across Uganda the country becomes daily poorer and less populated. The rich elephant-grass country of the Kingdom of Uganda is left behind and the road traverses rocky highlands. The latter are more picturesque, there are more flowers, and occasionally one can see a distant view of hills and valleys; but one day's march is very like another, uphill and down dale yesterday and today and tomorrow.

After 15 days' marching the character of the country changed more rapidly; undulations became steep hills, and valleys and swamps became clear mountain streams. The delight of drinking and washing in pure water instead of in the boiled mud, to which one was beginning to get accustomed, is a thing of which it is difficult to speak calmly. At a beautiful torrent with steep wooded banks I came unexpectedly upon a family bathing-party of yellow baboons, of all sizes from that of a mastiff to a small terrier; they ran about on the rocks and barked in the most alarming manner, and I was not at all sorry that the river was between us.

IN SIGHT OF RUWENZORI

There must be very few places in the world where one can walk in a couple of days from hot plains grilling under the Equator to a land of Alpine frosts and snows, where sun-helmets and mosquito-nets give way to furs and blankets, and the campfire serves no longer to scare away the lions, but to warm the shivering traveler. I have seen snow-capped peaks in New Guinea within 100 miles of the Line, but dense forests and the cannibalistic propensities of the natives make their exploration impossible without an armed escort. But it can be done in Ruwenzori, and, it seemed to me, after the many weary miles left behind, one of the most enchanting walks of my life. The path wound slowly up a wide valley through woods and fields and large gardens of bananas, crossing here and there a small tributary stream.

It is common to speak of Ruwenzori as a mountain, but it is in reality a range of mountains, with at least five distinct groups of snow-peaks. It has been described as the highest mountain in Africa, at least 20,000 feet high, and with an extent of thirty miles of glaciers; its height, as determined by the Duke of the Abruzzi, is slightly less than 17,000 feet, so that both Kilimanjaro and Kenia are

higher than Ruwenzori, and ten miles would more than cover the extent of its glaciers.

The first European to see Ruwenzori was probably Sir Samuel Baker, who saw what he called the "Blue Mountains to the south" during his exploration of Lake Albert in 1864; but it was not until 1887, when Stanley came from the Congo on the Emin Relief Expedition, that the mountains were definitely recognized as a snow range, and for very nearly twenty years more they remained as little known and as mysterious as ever.

CLIMBS IN THE RUWENZORI

One of the most remarkable features of Ruwenzori is the abrupt change that is often seen from one kind of vegetation to another. Above the tropical forest, which extends to about 8,000 feet, is a more or less constant zone of bracken and giant heath-trees, and above this, with a first sprinkling of *Podocarpus* and other large trees, begins the zone of bamboos which are found growing up to 11,000 feet, though their denser growth occurs between 9,000 and 10,000 feet.

The bamboos were so thick that we could not force a way through them, and cutting was too slow a process, so the natives adopted the plan of bending the bamboos down and walking over the top of them, which rather unusual method of procedure we followed for some time.

After struggling for miles through the dense jungle of bamboo, where all sense of direction was quickly lost, it was a relief beyond measure to come out occasionally onto tolerably level ground, where one could at all events get a glimpse here and there through the fog and rain, even though it meant exchanging the slippery slopes for swamps and sloughs, where the easiest path was knee-deep in mud and water.

The end of our day's journey was a steep black precipice, 400 or 500 feet high, called Kichuchu. At the foot of the precipice, which in one place was slightly overhanging, we found a small space, a few yards only in extent, of comparatively dry ground. It quaked ominously, like thin ice, at a heavy tread, but one does not employ the ordinary standards of wet and dry in such places. There was not room enough to pitch a tent, so we unfurled our beds and laid them close to the foot of the cliff, and as far as might be from the constant cascade of water, which splashed into pools from the overhanging rock.

The most notable feature of the camp at Kichuchu was the nocturnal chorus of the Ruwenzori ghosts. It was always said by the natives that there were devils high up in the mountains, and any one of a superstitious turn of mind who has slept or has tried to sleep at Kichuchu could well believe it. So soon as it became dark, first one and then another shrill cry broke the stillness; then the burden was taken up by one high up on the cliff overhead, then by others on the other side, until the whole valley was ringing with screams. Various theories were advanced to account for it; frogs, owls, and devils were among the suggestions, but the natives declared that the noises were made by hyraxes, and we discovered afterwards that they were right. It is possible that each actual cry was not very loud, but the steep hillsides and the bare wall of the cliff acted as sounding-boards, which intensified the noise to an incredible extent. It was one of the most mournful and blood-curdling sounds I have ever heard, and it caused an uncomfortable thrill, even after we had been assured that it had not a supernatural origin.

The upper Mubuku Valley—that is to say, from Kichuchu (9,833 feet) to the foot of the Mubuku glacier (13,682 feet)—is built in a series of gigantic steps of from 500 to 1,000 feet in height, between which lie tolerably level terraces of from one to two miles in length. The first of these steps is made by the cliff at the foot of which lies the rock-shelter of Kichuchu. The path leads up a sloping rift in the rock face, in some places so well sheltered that the dust of ages lies thick upon the ground, but more generally it is nothing but the bed of a stream, and is exposed to the drippings from the rocks above. A climb of about an hour brings one to the first great ter-

Photo from "From Ruwenzori to the Congo," by A. F. R. Wollaston

MOSSES ON THE HEATH TREES OF RUWENZORI: ELEVATION, 10,000 FEET
(SEE PAGE 261)

Photo by Vittoria Sella from "From the Ruwenzori to the Congo," by A. F. R. Wollaston

THE HIGHEST PEAKS OF RUWENZORI, FROM THE SLOPES OF KING EDWARD PEAK (KIYANJA)

These peaks lie almost across the equator. Their mantle of perpetual snow presents a striking contrast to the tropical character of the surrounding country (see page 263)

race. There is a small area of swamp, but this terrace is chiefly remarkable for the wonderful luxuriance of the heath-trees, which here attain their greatest growth.

STRANGE LOOKING HEATH-TREES

A heath-tree is a thing entirely unlike any of the trees of England; the reader must imagine a stem of the common "ling" magnified to a height of 60 or 70 or even 80 feet, but bearing leaves and flowers hardly larger than those of the "ling" as it grows in England. Huge cushions of many-colored mosses, often a foot or more deep, encircle the trunks and larger branches, while the finer twigs are festooned with long beards of gray lichen, which give to the trees an unspeakably dreary and funereal aspect. This first terrace was perhaps the most difficult and tiring part of the whole ascent, for not only did the heath-trees grow very close together, but the ground beneath them was strewn with the dead and decaying trunks of fallen trees, some of them hard as bog oak, and others ready to crumble at a touch, but all of them covered with a dense carpet of thick moss, which necessitated a careful probing before any step forward could be taken. The way in which our porters, encumbered as they were with awkward loads, hopped nimbly from one trunk to another made one feel thoroughly ashamed.

As we ascended the steep slope the heath-trees became rather less dense, and in the intervals between them appeared a few helichrysums, tall senecios with clusters of yellow flowers, and a beautiful little blue violet (*Viola abyssinica*) very similar to the English dog-violet. At the top of this slope, about 11,800 feet, the climber enters upon a new world, or, to speak more truly, it is a tract that seems to be a relic of a long-past age.

One would not be in the least surprised to see pterodactyls flying screaming overhead (they must have been noisy creatures, I think) or iguanodons floundering through the morasses and browsing on the tree-tops. But there are no living creatures to be seen or heard; it is a place of awful silence and solitude. It is an almost level meadow or "swampy garden," as Sir H. H. Johnston called it, a mile or more long and several hundred yards wide.

GIANT LOBELIAS AND GROUNDSELS

Out of the moss, which everywhere forms a dense and soaking carpet, grow thick clumps of helichrysum with white and pink flowers, and standing up like attenuated tombstones are the tall spikes of giant lobelias (*Lobelia deckenii*). Groundsels (*Senecio adnivalis*) grow here into trees 20 feet high, Saint Johns wort (*Hypericum*) is a tree even higher, and brambles (*Rubus doggetti*) bear flowers two inches across and fruit as big as walnuts. Through the middle of the meadow the Mubuku meanders over a gravelly bed, as perfect a trout stream in appearance as one could wish to see. On either side are steep rocks and slopes covered with heath-trees looming like ghosts upward into the everlasting fog. At its upper end the meadow is bounded by an almost precipitous wall, over which the Mubuku stream falls in a splendid cascade.

Our next camp was pitched under the shelter of another overhanging cliff, and surrounded by huge blocks that had fallen therefrom. Our porters found refuge in all sorts of queer holes and crannies among the rocks. There was not space enough to pitch a tent, and we were a miserable little party as we sat huddled round a fire of sodden heath logs, which produced only an acrid and blinding smoke.

The cliff overhead is the haunt by day of large fruit-eating bats (*Roussettus lanosus*), which measure about two feet across the wings. At sunset they come flapping out, and for a second or two afford a chance of a difficult shot before they disappear through the heath-trees towards the valley below. To judge from the number of their tracks, which we found about the camp and far up the mountain sides almost to the snow level,

leopards and another smaller cat were fairly common, but we never chanced to see one. Our first night at Bujongolo I shall never forget by reason of an earthquake, the most severe I have ever felt, which awoke me from a troubled sleep. Every moment—it seemed to last for minutes instead of, probably, for a few seconds only—I expected to see the cliff, which made our roof, come crashing down to put an untimely end to our travels.

A short distance above Bujongolo, where it flows through a deep and narnow gorge, the Mubuku takes a sharp bend to the right (north), and at the same time the valley widens out into the third and last of the great swampy terraces, at an altitude of rather less than 13,000 feet. As one comes out from the last of the heath forest at the bend of the valley, there is suddenly unfolded a glorious view of mountains and snowfields. In the middle of the view towers up the beautiful peak Kiyanja (King Edward Peak) with two glaciers on its flanks to the right at the head of the valley, the great Mubuku glacier thrusts its long nose almost down to the valley floor, and on either side are jagged peaks with steep black precipices and gentler slopes of snow.

During all the eight or nine days that our two expeditions to Bujongolo together counted, I do not suppose that the mountains were visible for half as many hours; but the place was so grim and solemn, and so almost unearthly in its setting, that the scene is far more firmly impressed upon my memory than many that I have seen a hundred times more often. The lower slopes were covered with lobelias and senecios and helichrysums and the inevitable moss.

NEW BIRD DISCOVERED

Here was found one of the most striking, and not the least interesting, of the many new birds that were discovered by the expedition. This was a sunbird (*Nectarinia dartmouthi*) of a dark metallic green color, shot with a wonderful iridescent purple. Two feathers of its tail were prolonged several inches beyond the others, and upon its breast, almost hidden by the wings, were two tufts of short crimson plumes. To see one of these little birds perched upon a tall blue spike of lobelia, fluttering his wings and flirting his long tail, was one of the prettiest sights imaginable. Sunbirds and large Swifts, which live in the steep rocks like the Alpine Swifts in Europe, were almost the only living things to be seen.

The first expedition that we made from Bujongolo was to the head of the Mubuku glacier. A mile or more of ploughing through swamp took us to the end of the level terrace, beyond which we mounted at first over an old moraine covered with a forest of senecios, and then over smooth, glacier-worn rocks coated with moss and oozing with water, and up through a curious tunnel, formed by a huge block jammed across a gully, to the foot of the glacier (13,682 feet). We had often noticed far down in the valley below that there was no great difference in the volume of the Mubuku from morning to evening, as there is in the glacier-fed streams of Europe, and the reason was apparent when we came to the Mubuku glacier. Both early and late there was never more than the merest trickle of water flowing from this glacier. The reason, which has been pointed out by Mr. Freshfield, is that in Africa, as in other tropical and subtropical regions, notably the Sikkim Himalayas, the glaciers lose most of their substance by evaporation.

It was pleasant to think that a part of that tiny stream would perhaps find its way into the great river, which goes swirling past the temple of Abu Simbel and carries fatness to the fields of Egypt. We scrambled up a few hundred feet of loose and rotten rocks, more dangerous than difficult, and then took to the glacier near the top of the ice-fall, where it was necessary to cut a few steps among the seracs. From the top of the ice-fall we made a wide detour across the glacier to avoid the risk of an avalanche from a little hanging glacier on our right—the

remains of recent avalanches were scattered all about us—and thence an hour's walk up an easy snow-slope took us to the top of the ridge and the rock.

THE ASCENT OF KING EDWARD PEAK

On the following day, soon after sunrise, we set out for Kiyanja (King Edward Peak). Instead of following the Mubuku valley up the wide terrace to the glacier, we turned off towards the west, up a small tributary stream, and soon found ourselves in difficulties. Slopes which from a little distance looked smooth and easy enough were found on closer acquaintance to be cut up with gullies and water-courses and clothed in the most disheartening vegetation that ever resisted the footsteps of a climber.

We could not complain much about sinking at every step almost to the knees in moss and black slime; but through the moss grew, as high as one's head, a tangle of "everlasting" bushes, as stiff and wiry as broom, through which we had to force our way as best we could. The tall, upright spikes of the lobelias seemed to offer a sure support, but they generally crumbled away at a touch and sent one sliding down the slope again, while the stems of the senecios were too slippery with moss and moisture to be of any use in hauling oneself up the hillside. It would have been hard work enough anywhere to make much headway over ground of that sort, but at an altitude of about 14,000 feet, where we had not been long enough to have become acclimatized and where the slightest exertion was a labor, it only needed a word from one to the other of us and we had beaten a retreat. Luckily the word was not spoken, and, after we had lightened our burdens by leaving behind us cameras and all but the most necessary food, we struggled on with less difficulty.

At a height of about 14,500 feet all our difficulties were practically at an end; we had passed beyond the limit of the lobelias and the bushy "everlasting," though another species (*Helichrysum stuhlmanni*) was found up to 15,000 feet, and the senecios were getting fewer, until at 14,800 feet they ceased altogether. Rocks, partly moraine and partly blocks that had fallen from a high cliff on our left, began to replace the moss and mud —a most welcome change. Very fortunately we had had a clear view of the mountain earlier in the day, and had mapped out the course that we proposed to take, noting certain prominent landmarks. Had we not done so, there would have been nothing for us to do but to stay where we were or retrace our steps, as the clouds were low down on the mountains when we came to the foot of the rocks. However, we groped our way blindly forward, and luckily recognized a big wall of granite rock, which had shown up conspicuously pink from below.

Here, in order to make certain, if possible, of finding our way back through the fog, we filled our pockets with "everlasting" flowers, which we scattered, like Hansel and Gretel, every few yards as we went along. Often as I had maligned the "everlastings" before, I blessed them that day; they undoubtedly saved us from a night out on the mountainside, if not from worse things. After climbing up a few hundred feet of steep but easy rocks, we came on to a small glacier, bare and dry in its lower part, but covered with an increasing depth of snow as we went higher. A black mass before us loomed huge through the fog, and seven hours after leaving camp we stood on the peak, which seemed from below to be the summit of Kiyanja (King Edward Peak). We built a small cairn, and, to keep ourselves warm, hurled huge boulders down the steep eastern face of the mountain into the Mubuku valley. It is an attractive amusement, but not one to be recommended in regions more populous than Ruwenzori.

We waited as long as it was safe to do, if we were to get back to camp that night, and were just preparing to descend when a warm slant of sunshine pierced the fog, the clouds boiled up from below, and we looked right down the Mubuku Valley and saw the river winding away over the yellow plain of Ruisamba and the blue hills beyond. It was one of the rare glimpses that one gets from the Alps of

the Lombard Plain, but it lasted only for a moment before it was blotted out again. Then there came a clearing on the other side towards the north and west, and we saw that we had missed the real top of our mountain, King Edward Peak (15,988 feet), which rose perhaps 150 feet higher than the point that we had reached and was connected with ours by an arete of snow. It was disappointing to have missed it, but it was too late then to go further. Towards the northwest was a big snow-peak about 400 feet higher than ours, forming a big western buttress of the range; and further away, apparently three or four miles to the northwest, appeared two beautiful sharp-pointed snow-peaks, which seemed to be about 1,000 feet higher than our peak and must be unquestionably the highest peaks in the range.

Our estimate of their heights proved to be approximately correct. The Duke of Abruzzi found their heights to be 16,815 feet (Margherita Peak) and 16,749 feet (Queen Alexandra Peak). The peaks were seen rising out of a dense bank of clouds which lay between us and them, so that it was impossible to tell in what way they were connected with the other peaks of the range. All too soon the clouds enveloped us again more densely than before, and it was fully time to start back towards Bujongolo. Thanks to our trail of "everlasting" flowers, we lost no time in the descent, and we staggered into camp just as darkness set in, after one of the most tiring days I have ever experienced.

The attempts that we made to penetrate into the heart of the range were hopelessly handicapped by lack of means and equipment. We were not in any sense a climbing party, and our excursions were made during the course of other occupations.

Now that the peaks and glaciers of Ruwenzori have been explored and named (some of them for the third and fourth time) by the Duke of Abruzzi and others, it is unlikely that the range will often be visited. Tourists who go to Lake Victoria will think twice before they venture on a three weeks' march across country; and, if that be not enough, the atrocious climate and the chance of seeing nothing when you get there because of the fog and rain will keep away all but the most enthusiastic and determined mountaineers.

COLLECTING SPECIMENS

Our party camped for four months on the east slope of Ruwenzori, making natural history collections for the British Museum. The natives soon discovered that they could make an appreciable addition to their incomes by hunting and bringing in beasts of various sorts. Hyraxes, gigantic rats, bats, mice, worms, beetles, chameleons, and snakes came pouring in when once it was found that there were people mad enough to pay for such follies. The care with which they secured the captive beasts and the air of mystery and importance with which they produced them were always a source of amusement.

If it could by any means be avoided, they would never hold a beast in their hands, but always bind a string of banana fiber round its neck and attach that to a stick, or else they wrapped the creature in elaborate parcels of banana leaves, which they opened with a great display of caution and pretense of fear. The moment of unpacking the parcel was always an exciting one, as you never could tell what might be produced; a mouse might make a sudden dash for liberty, or a swarm of beetles or crabs come scurrying out, or a few chameleons would come strolling out, looking fearfully bored, or half a dozen bats would flap out into the sunshine.

THE CHIMPANZEES

There were a great many chimpanzees in the forest; their "nests," light platforms of sticks built in the forks of high trees, were frequently found, and often at night one would hear their cries near the camp; it was a most melancholy sound, like the wailing of children in distress. They are shy animals and are not very often seen, but on one occasion we had an excellent view of a small family party, a baby with its two pa-

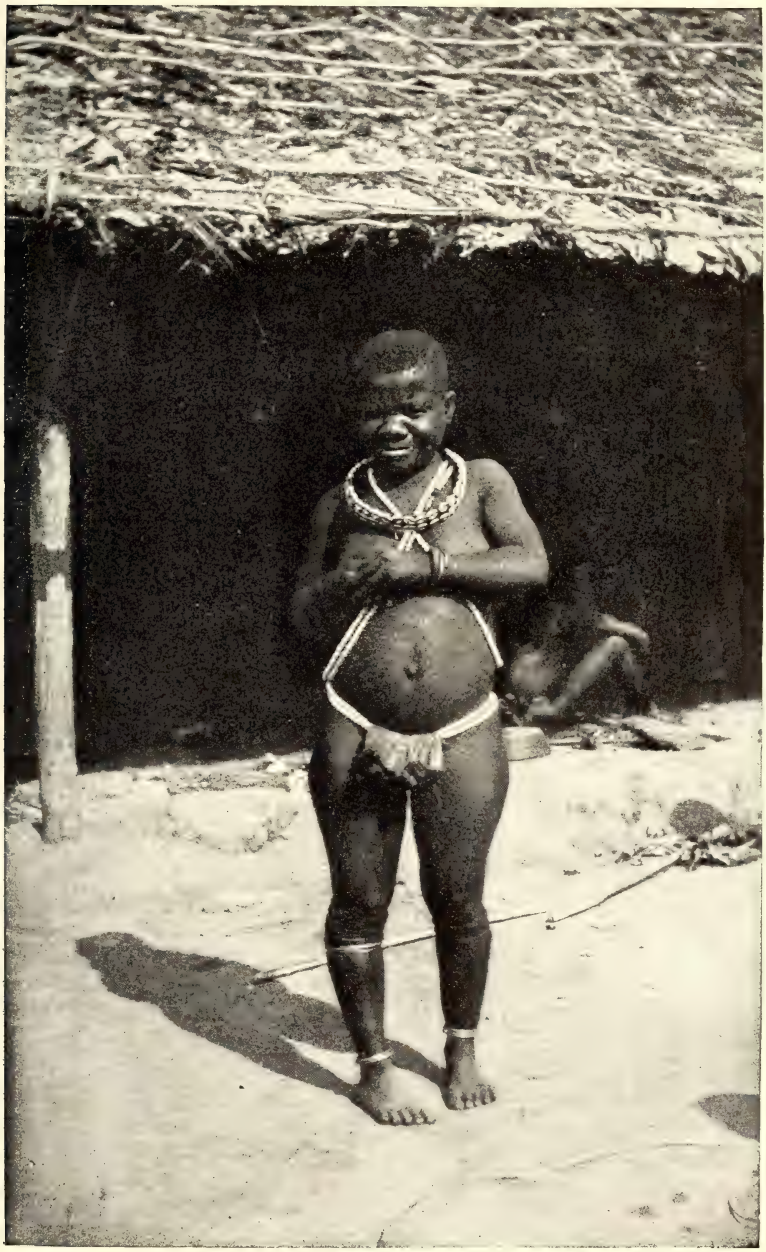


Photo from "From Ruwenzori to the Congo," by A. F. R. Wollaston

A PYGMY LADY OF THE GREAT CONGO FOREST (SEE PAGE 268)

Photo from "From Ruwenzori to the Congo," by A. F. R. Wollaston

A TATTOOED BEAUTY FROM THE LOWER CONGO

rents, feeding on the fruit of a tree below the camp. With the help of field-glasses it was easy to see the almost painfully human gestures of the old ones, as they helped the little one to move from branch to branch and fed it with berries. Although they are most commonly found in the tropical forests at a lower level, chimpanzees wander about a great deal and go far up the mountains in search of food; we found traces of them at a height of nearly 10,000 feet in Ruwenzori, where they had been feeding on the berries of a podocarpus.

GAMBOLING HIPPOS

A few miles from Albert Edward Nyanza we came to a circular lake, once a crater, about half a mile wide. The water is slightly salt and is greatly appreciated by the hippos, who come here in large parties to bathe. The lake is shallow for a few yards only, and then deepens rapidly, so the hippos, who do not like deep water, never go very far from the shore.

On a still day it is an amusing pastime to sit by the lake and watch the great brutes enjoying themselves. For a moment nothing is to be seen, then suddenly a score or more of huge heads burst through the surface with loud snorts and squirting jets of water through their nostrils. They stare round with their ugly little piglike eyes, yawn prodigiously, showing a fearful array of tusks and a cavernous throat, and sink with a satisfied gurgle out of sight, to repeat the performance a minute or two afterwards. Sometimes one stands almost upright in the water, then he rolls over with a sounding splash, showing a broad expanse of back like a huge porpoise; or a too venturesome young bachelor approaches a select circle of veterans, who resent his intrusion and drive him away with roars and grunts. There is something irresistibly suggestive of humanity about their ungainly gambols; only bathing-machines are wanted to complete the picture.

POWERFUL BIRDS

There are two birds which will live in my memory long after I have forgotten everything else about this region. One is the Bateleur eagle, which may be called the first-class cruiser among birds; for power and swiftness of flight there is none that can compare with it. With its long wings and curious stunted tail, it looks more like a huge bat than a bird, as it sails high overhead, never flapping its wings, but giving just an occasional tilt from one side to the other. One moment it is here, and the next it is a speck almost out of sight across the plain.

The other is a very remarkable species of Nightjar, in which some of the feathers of the wing, particularly the second primary, are enormously lengthened; the longest that was measured had a length of 21 inches. These birds sleep during the day in warm places on the hillsides until sunset, when they fly down to the low ground about the lake. The long feathers, trailing out like streamers behind them, give the birds a most unnatural appearance, as if they had four wings; but though one would expect the long feathers to be rather an encumbrance than otherwise when the bird is chasing insects, it can turn and twist in flight as quickly as a peewit.

ACROSS THE BORDER IN THE CONGO STATE

After coming from Uganda, where the natives are not allowed to carry weapons, it was strange to us to see all the people going about armed across the border in the Congo State. The majority of them carried spears, while a good many carried a short bamboo bow and a quiver full of arrows made of reeds pointed with curiously fashioned tips of metal. Our stay was enlivened (if it may be said without disrespect to the departed) by the death of Kilongozi, the big chief of the district. Many of his vassals had assembled several days before in anticipation of his death, and as soon as the event was announced it was greeted with a chorus of shrieks and wails, which resounded throughout the country and continued with brief intervals for several days.

The chief was buried beneath the floor of his house, about which his subjects,

to the number of more than a thousand, congregated in a dense throng. During the first day they were fairly quiet, and contented themselves with dancing slowly to the tune of the inevitable drums and with firing off guns at intervals. On the following days, inspired by the "pombe," which they drank in immense quantities, they were rather more boisterous in their grief. The women, and some of the men, attired themselves in a sort of very short ballet-dancer's skirt made of banana leaves, in which they performed some very quaint and intricate dances. Sometimes the women would stand aside, and the crowd of men, dividing into two opposite parties, would perform a war-dance or mimic battle, shrieking and howling like lunatics.

Fortunately etiquette forbids the wearing of spears and knives at a funeral, and harmless reeds are carried instead, or there might have been accidents. There were hundreds of drums and trumpets of ivory or antelopes' horns and whistles of various sorts in the crowd, and the deafening din which they produced was still in progress when we left Beni.

There was formerly a fairly good road through the Congo forest north from the foot of Mount Ruwenzori, but now, owing to the attitude of the "revoltes" natives, it has gone out of use, and owing to the action of elephants and buffaloes, which swarm in this part of the forest, it has gone sadly out of repair. The beasts were there in such numbers that in some places the air was full of the strong and bitter odor, which one associates with the elephants' house at the zoo. The path was pounded and churned into a sort of red cream by the feet of the monsters, and every tree-stump was polished bright and smooth, where they had scratched their huge sides, or, nearer the ground, there the buffaloes had rubbed their horns. Although there are so many—you see the bushes swaying and hear them crashing away perhaps within a few yards of you, and hear them trumpeting at night—the beasts themselves are very seldom seen.

It was in this part of the forest that the okapi was first discovered a few years ago, and it is probable that they are more plentiful, or, to be more accurate, less scarce, in the Semliki and Ituri forests than elsewhere. Any one who is anxious to procure a specimen of this strange creature must obtain first a special permission from the Congo government, and, secondly, the friendship of a tribe of Pygmies; the latter can best be managed by a liberal offering of salt, their most valued necessary. With reasonable luck and the exercise of patience, he might be expected to get an okapi within a few months' time.

THE PYGMIES

The Pygmies live almost exclusively by hunting; they grow no crops and they do not manufacture their bows and spears; these they obtain in exchange for game from the other inhabitants of the forest, who also supply them with bananas and other produce. They have no settled dwellings, but each tribe or family seems to have a definite hunting district, whose bounds they never transgress; they sleep wherever they happen to be, and we were constantly coming across their tracks and their little shelters, the flimsiest structures of sticks thatched with leaves.

The first Pygmy that I met greeted me with a shout of "Bonzoo, Bwana (sir)"; he had been for a time in a Congo post, and "Bonzoo" was his version of "Bon jour." He was a cheerful little person, about four feet high, and he shook hands effusively; his was one of the most perfectly shaped hands I have seen, but cold and clammy, as the hands of most black men are. Now that some of his cousins—brothers, perhaps—have toured about England and have exhibited in music-halls, the appearance of Pygmies is doubtless familiar to every one, and it need hardly be remarked that even in the Congo they have not all yet learned to speak French.*

*For a further description of the Pygmies and the great Congo Forest, see "A Journey through the Congo State," by Major Powell-Cotton, in March, 1908, NATIONAL GEOGRAPHIC MAGAZINE.

Photos from Bishop Hartzell

IVORY AND RUBBER AT MATADI, ON THE CONGO RIVER

NATIVES WITH IVORY: CONGO REGION

Photo from Bishop Hartzell

SPECIMEN OF TATTOOING YOUNG NATIVE GIRLS: NEAR THE COAST OF BRITISH EAST AFRICA

The path is nearly always as bad as can be—often it is nothing but a succession of fallen trees and muddy elephant-baths; but there is a subtle fascination about walking through the forest, which increases as the days go by. The best way to feel the forest is to walk far ahead or, as I lazily preferred to do, miles behind the caravan, far beyond the sound of a disturbing gunshot or of the unceasing chatter of the porters. Sometimes there is a sound of crashing through the trees, where a herd of elephants have been disturbed in their siesta; sometimes a troop of monkeys dash twittering through the tree-tops, or huge topheavy-looking hornbills fly overhead screaming uncouth discords; but more often the silence of the forest is unbroken and complete, and you may walk for miles at a time and not hear a sound or see a sign of living creature. It may be only a result of the half gloom and one's sense of smallness amid the vast surroundings, or it may be an instinct inherited from prehistoric forest-dwelling ancestors; but, whatever the cause may be, you find yourself walking with unwonted care and ever on the alert for an unknown something.

It was only in the infrequent clearings, where we camped, that we realized how immense, compared with our insignificant tents, the trees of the forest are; as a rule, their height is greater in proportion to their girth than is the case with an ash or an elm. The forest is seldom level; it is always gently rising or falling, as much one way as another, and it was not until we found one day that the streams were no longer flowing to our right into the Semliki that we realized that we had crossed the watershed into the basin of the Congo.

Wandering on, day after day, through the forest, one began to wonder, "Shall we come out of it all some day, as one does from a tunnel?" and our coming out of it was almost as sudden as that. Without any warning, except that for a mile or so the trees had become perhaps a little smaller, the forest ended abruptly, and we found ourselves on the edge of an open, hilly, grass country that stretched as far as we could see to east and north.

LIONS ARE NOT USUALLY DANGEROUS

The few inhabitants of the district about Albert Edward Nyanza, on the Uganda side, seem to be almost wholly a water-side people, who live entirely by fishing. At the southeast corner of the lake are some curious colonies of lake-dwellers, whose huts are built several yards from the shore, with the object, presumably, of escaping the attack of the lions, which are always in attendance on large herds of game. At a small village at the extreme south end of the lake our camp was surrounded by a high reed-fence for the same purpose, and only a few days before we arrived there a man, who incautiously went outside the fence after dark, had been carried off and eaten.

They are chiefly nocturnal in their habits, and the country where they live is usually so densely clothed with grass or scrub that, unless you go out with the express purpose of hunting them, the chances are very much against catching a glimpse of a lion at all. In cultivated districts, so far from being a source of public danger, lions may be looked upon as the friend of the agriculturist. Like the tigers in some parts of India, their favorite food is the wild pigs and small antelopes which play such havoc among the crops, and their complete extermination would not prove to be by any means an unmixed blessing. It is only very rarely that men are attacked by them. Of course, if a man is foolish enough to walk about after dark, he offers a tempting meal which no hungry lion would be likely to refuse; but instances of lions, like the famous man-eaters of Tsavo, acquiring a preference for human flesh and breaking into huts and tents to seize men are quite exceptional.

VIRULENT FEVER CAUSED BY TICKS

We had intended to stop for a few days to visit the villages of the lake-dwellers, but in that we had reckoned without the spirillum. There is a species

Photo from Russell Hastings Millward

PRIMITIVE METHOD OF STRIKING FIRE IN MANY PARTS OF AFRICA (SEE PAGE 273)

of tick (*Ornithodoros moubata*), a frequenter of native houses and old camping places, which carries in its blood a micro-organism called *Spirochæta duttoni*. When it is introduced into the blood of a man by the bite of one of these ticks, the *spirochæta* is the cause of a particularly unpleasant relapsing fever. An ordinary attack lasts for two or three days, and recurs again after an interval of a week or more; in severe cases the attacks may be continued for months. Hitherto no satisfactory remedy has been discovered for the fever, and all that can be done is to take steps to avoid being bitten by the tick.

There are some districts in which the fever is so prevalent that it is difficult to induce porters to travel through them. It is useless to tell them that if they sleep in the old shelters they will get fever; they smile indulgently but incredulously at the crazy European, and unless they are turned out of the old shelters and compelled to make new ones, tick-bites and spirillum fever are the speedy results. The Uganda government has ordered the destruction of the camp shelters along the roads in the worst infected districts, and it is hoped that in this way the disease will be kept with bounds.

In spite of all our precautions, my friend and I fell victims to it.

PRIMITIVE METHODS OF CARRYING FIRE

The people of the Kivu region still retain the primitive method of obtaining fire from wood. The apparatus is simple enough and consists of a slender stick of hard wood, a flat piece of soft and partly charred wood (often a segment of a bamboo), and a scrap of inflammable material, such as rag or bark. The slender stick is placed upright upon the soft wood and is rotated very rapidly between the palms of the hands; the tinder, placed close to the point of contact, smoulders in a few seconds and can easily be blown into a flame. Many of them were glad enough to sell their fire-machines for a small box of Swedish matches.

In districts where this method of obtaining fire is not employed the natives have a convenient habit of carrying fire secreted somewhere about their persons. If he is a person who wears a rag of some sort, he probably has a fragment of smouldering wool or fiber tied up in a corner of his garment. If he is very scantily attired, his fire will be carefully folded up in a piece of banana leaf and attached to his spear or stick, as the case may be.

In the old days of African travel no doubt any kind of cloth and beads of any size or color were welcomed everywhere; but the old order has changed. It is true that our beads went like hot cakes round the shores of Lake Albert Edward, but when we came to the volcanoes and southward, the natives turned up their noses (or made an equivalent grimace) at our beautiful blue-glass beads and would have nothing of them. They said they must have red beads—small red beads—or none at all. In other places they wanted small blue beads or large red beads, and so on. It was the same with the cloth; one district had a preference for blue cloth, another for white, and another for spotted cloth. There are as many different fashions in beads and cloth in Central Africa as there are in ladies' hats and gowns in more civilized countries.

THOUSANDS DESTROYED BY SLEEPING-SICKNESS IN CONGO STATE

The country around the west coast of Lake Tanganyika, in the Congo Free State, has been almost entirely depopulated by sleeping-sickness, which was unknown on the shores of the lake until the year 1903. Whole villages have been wiped out and huge tracts of fertile land along the lake which were formerly cultivated have become impenetrable jungle. One day we passed the deserted relics of a mission station which had been the center of a large settlement; the people had all died or had migrated to a less cursed country, and there were no pupils left to be taught by the Fathers, who had, therefore, gone elsewhere. Almost daily, as we walked westward from Tanganyika, we passed corpses by the roadside, dead of the terrible sickness; and it was no uncommon thing for the

caravan to make a wide detour to avoid some unspeakable horror.

The people are brutally inhuman to the victims of the disease. So soon as a man becomes incapable of supporting himself he is turned out of the village to subsist for a short time on loathsome garbage and soon to starve like a dog. So long as I live I shall be haunted by the recollection of one of these miserable creatures who came crawling about our camp not far from Tanganyika. The porters—"our black brothers," as some people would call them—were stuffing themselves on the fat of the land at the time, and though he was one of their own tribe, they jeered at his infirmities—he could not walk, but dragged himself along the ground with his hands—and refused to give him a scrap of the food for which he begged. Heartrending spectacles of this sort can be seen on the outskirts of almost every village between the Congo and Tanganyika.

The Congo State is making strenuous efforts, by the establishment of lazarettos in which infected people are confined, to check the spread of the disease; but it is a task beset with innumerable difficulties, and the medical staff of the State is hopelessly inadequate in numbers. Thus, for the whole of the Russi-Kivu District, which is about as large as England without Wales, there are two doctors; for another district, which is roughly the size of Ireland, there is one doctor. So it frequently happens that an unfortunate official who falls ill in a remote station is twelve or fourteen days' journey from the nearest doctor, who arrives only in time to find him either recovered or in his grave.

CIVILIZATION IS RESPONSIBLE FOR SPREAD OF DISEASE

It is only fair to say that the doctors, who are mostly Italians, work most nobly and perform wonderful feats of traveling by day and night; but it is manifestly impossible for them to devote much time to the study of native diseases or to take very active steps towards preventing the spread of sleeping sickness. On our way down the Congo I visited three or four of the State lazarettos, which (with one exception) were well conducted; but with such a splendid highway as the river itself forms, it is excessively difficult to check the movements of infected but unrecognized individuals, who are a constant source of danger wherever they go.

It is a lamentable fact, but one which cannot be gainsaid, that civilization must be held responsible in no small degree for the spread of sleeping sickness during the last few years. In the old days, when every tribe and almost every village was self-sufficient and had no intercourse with its neighbors, except in the way of warfare, it might very well happen that the disease became localized in a few districts, where its virulence became diminished. Nowadays, with the rapid opening-up of the country, the constant passage of Europeans traveling from one district to another, and the suppression of native warfare, it is becoming increasingly easy for natives to move beyond the limits of their own countries, and by their means sleeping sickness is spread from one end of the country to another. The prevention of the disease is by far the most serious problem which confronts Europeans in Africa, and the outlook at the present time is at the best a gloomy one. (See also page 257.)

Sleeping sickness, properly so called, is the name applied to the terminal stages of trypanosoma infection, or trypanosomiasis.

Trypanosomes belong to the *Hæmoproteidæ,* a group of the *Hæmoprotozoa,* organisms which inhabit the blood of many vertebrates, fishes, birds, reptiles, and mammals. The disease has been known in Africa for more than a century, but its connection with the trypanosome was not recognized until 1902. In that year Dutton, in the Gambia Colony, found a trypanosoma, which he called *Trypanosoma gambiense,* in the blood of a native suffering from a fever of non-malarial character. In the same year Castellani, in Uganda, discovered trypanosomes in the blood and in the cerebro-spinal fluid of cases of sleeping sickness. He suggested that the parasite is

Photo by Prof. William M. Davis, Harvard University

ON THE ZAMBEZI

the cause of sleeping sickness, and this has been fully proved by the researches of Bruce and others, who have also shown that the infection is transmitted by the tsetse-fly.

IT IS CARRIED BY THE TSETSE-FLY

Trypanosoma gambiense has been found in West Africa from about 15° north to 15° south latitude; it is widely spread in the Congo basin, reaching a point about 11° south in the Lualaba River; it is found in the Tanganyika region and in Uganda and along the Nile as far as 6° north latitude. But its distribution is not uniform over this vast area; it corresponds with the distribution of a tsetse-fly, and is thus confined to the banks of rivers and lakes.

Nothing is known of the life history of the trypanosome, and it is impossible at present to make a dogmatic statement as to the relations which exist between it and the tsetse-fly. It seems probable that the tsetse-fly serves as an alternative host in a truly biological sense and not as a simple mechanical transmitter.

It has been proved beyond question that the infection is transmitted by a species of tsetse-fly (*Glossina palpalis*), but it is not definitely known that it is never transmitted by other species as well. It has been stated that a species of mosquito (*Stegomyia* sp.) is also capable of transmitting trypanosomiasis.

The disease affects individuals of all ages and of both sexes. Males, perhaps, more often contract the disease than females, because they are more constantly exposed to the attacks of tsetse-flies during the course of their occupations as paddlers, fishermen, etc.

In the advanced stages of the disease, the sufferer lies about in the corner of his hut, indifferent to everything going on about him, but still able to speak and take food if brought to him. He never spontaneously engages in conversation or even asks for food. As torpor deepens, he forgets even to chew such food as is brought to him, falling asleep, perhaps, in the act of conveying it to his mouth or with the half-masticated bolus still in his cheek. As the lethargy becomes more continuous, he wastes quickly from lack of nourishment, and the end is brought about either by coma or by the increasing weakness.

The mortality of the disease must be reckoned as 100 per cent. It is possible, but there is no definite knowledge on this point, that recovery may take place in the very early stages of trypanosomiasis, but when once the sleeping-sickness stage of the disease has been reached it is probably invariably fatal.

INVESTIGATIONS BY DR KOCH

Not longer ago than September, 1907, Professor Koch, in reporting on his investigations made in Lake Victoria, added yet another terror to the already gloomy outlook on sleeping-sickness. He found a large number of cases in districts where the tsetse-fly was absent. The majority of the cases were undoubtedly imported, occurring in people who worked in the rubber industry in forests along the lake shore, where tsetse-flies abounded. But fifteen of the cases could not by any possibility have been imported. All were women and all were wives of men employed in the rubber industry in a tsetse-fly area. Assuming that no other biting insects than tsetse-flies are capable of transmitting the disease, the only tenable hypothesis is that these women contracted it from their husbands. If Professor Koch's observation is correct, the prospect of eradicating sleeping-sickness is a sufficiently remote one, as not only can the disease be transmitted by a widely-distributed fly, but it also belongs to the category of venereal diseases, and experience of many centuries has shown the difficulty of stamping out diseases of this class.

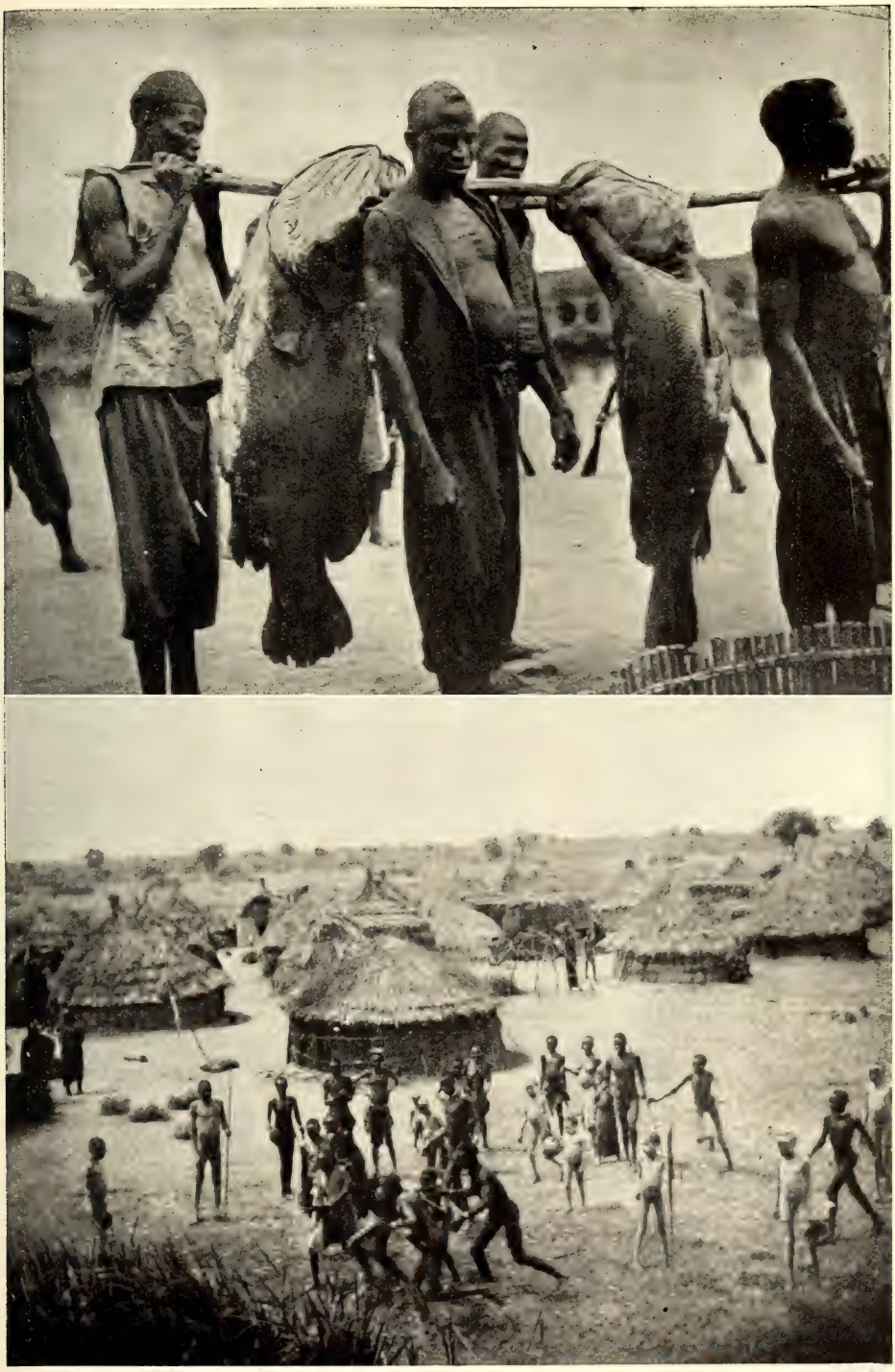
If the natives could be induced to wear some sort of light garment, they would obtain a certain measure of protection; but water-side populations in Africa usually go even more naked than others.

The most recent recommendation is that of Professor Koch, who asserts that in the neighborhood of the Victoria Nyanza the tsetse-flies subsist almost entirely on the blood of crocodiles; he therefore suggests the extermination of these reptiles by the destruction of their eggs. It is difficult to take this suggestion really seriously, because the numbers of crocodiles are so immense, their distribution is so wide, and their powers of reproduction so great.

THE TSETSE-FLY

The tsetse-flies (*Glossinæ*) comprise ten species, which are confined to Africa. They are sombre-colored, narrow-bodied flies from about 8 to 12 millimeters long, with a thick proboscis projecting horizontally in the front of the head. When the fly is at rest the wings overlap each other, crossing like the blades of a pair of scissors. *Glossina palpalis* has been found from Senegal to Angola on the west, through the Congo and Lualaba to Tanganyika and the Victoria Nyanza, and northward along the Nile to the Uganda-Sudan border. The flies are seldom, if ever, found above 4,000 feet and always near water. A swampy shore is not much to their taste; they are most commonly found along those stretches of river bank or lake shore where there is a beach of mud or sand overhung by trees or bushes.

Tsetse-flies do not lay eggs, like most diptera, but larvæ, which turn into the pupa condition almost immediately after extrusion. The perfect flies, both male and female, are blood-suckers. They feed during the day, and by reason of their exceedingly rapid flight and the extraordinary softness with which they alight on their victims, it is very difficult to detect them until after the mischief has been done.



Photos by Herbert L. Bridgman

VILLAGE SCENES ON THE NILE, NEAR BOR

For a description of that region north of Uganda, through which President Roosevelt will journey, see "The New British Empire of the Sudan," by Herbert L. Bridgman, NATIONAL GEOGRAPHIC MAGAZINE, May, 1906.

NATAL: THE GARDEN COLONY

By Russell Hastings Millward

Formerly American Vice-Consul at Durban, Natal

A VAIN attempt to discover a sea route to the East Indies, the same purpose which carried Columbus westward across the Atlantic Ocean, sent Vasco da Gama southward along the coast of Africa, and, after rounding the Cape of Good Hope, his small fleet, consisting of three caravels, was brought to anchor in latitude 29° 52′ south, longitude 31° 2′ east. This was on Christmas day, 1497, and as the intrepid Portuguese navigator was carried ashore he christened the newly-found territory Natal, "Christmas Land," or "Land of the Nativity." No more befitting name could have been applied, and today Natal is known as "The Garden Colony" of Great Britain.

A ZULU NURSE BOY IN DURBAN, NATAL
Zulu women are seldom employed as domestics

As the harbor is entered, the bay with its wide expanse of water and the imposing bluff with its thickly-wooded background of green hills, present a magnificent view. Just across the bay can be seen the town of Durban, described by Max O'Rell as "the prettiest and most coquettish town in the South African colonies"—the blue Indian Ocean at its feet and a series of terraces, banked with flowers and foliage, rising from the sealevel to a height of 500 feet. Durban enjoys the distinction of being a seaport and watering-place as well as one of the finest coaling stations in the world. Here, from a waste of sand and bush, trampled by wild beasts and serpents, has sprung one of the leading business centers of South Africa. From a quaint little two-mile railroad, the first in Africa, built in 1860, from the point to Durban, has developed over 1,200 miles of modern railways connecting with the interior and placing this picturesque port in a position second to none as a shipping point. The chief exports from here consist of wool, sugar, tea, hides, skins, angora hair, coal, maize, and wattle bark.

Upon arrival at the docks in Durban a long line of rickshas will be found waiting to carry passengers swiftly and silently to their destination. For sixpence an interesting ride can be had through the town, including a trip along the esplanade by the bay and the Victoria embankment. Of all the sights in South Africa none is so impressive as the ricksha boy, with his head-dress of great horns and colored feathers and his highly-decorated, whitewashed legs. Perhaps he will tell you that he is "Champagne Charley" or "Jim Fish," names of two clever runners who won fame by

Photos by Russell Hastings Millward

A "RICKSHA" RUNNER IN DURBAN

ARAB CHILDREN LEARNING THE KORAN AT THE MOSQUE IN DURBAN, NATAL

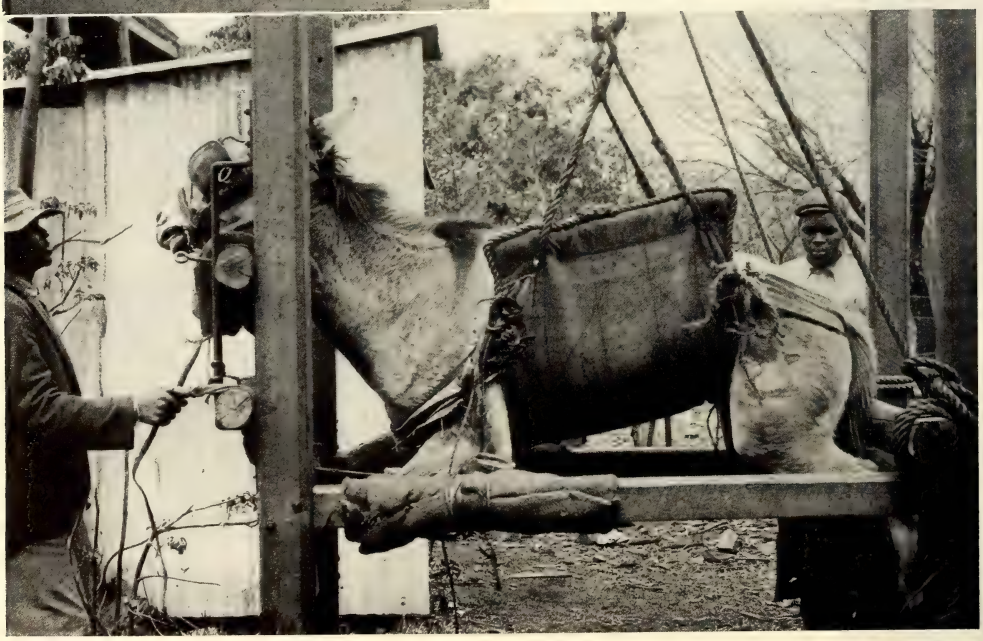
their marvelous performance in carrying dispatches for great distances.

Many of the Zulu runners can cover with ease 100 miles in 24 hours, afoot, and that, too, over rough ground that is almost impassable to the white man. The ricksha, however, with its picturesque runner is now being rapidly replaced by the more modern horse cab, and it is a matter of but a short time before this distinctive feature of Natal shall have passed entirely.

To the tourist Durban offers a wealth of attractions. The numerous well-ap-

pointed hotels, the botanical gardens, the driveways and parks, with their semi-tropical trees and plants, the cricket field, the polo grounds, the many types of architectural beauty exemplified in the public buildings, and the back beach, with its unexcelled bathing facilities, are at all times most agreeable. Although it is occasionally quite hot during the summer months, Durban affords an excellent resort in the winter season, from May to August, when the days are dry, cool, and unclouded.

A visit to the Indian quarter, with its Mohammedan mosque, coolie markets, and numberless Hindoo shops, will be well worth while. The Arab children, studying the Koran aloud in the classroom at the mosque, present a most pathetic side to the recent Indian invasion of South Africa which is now attracting such worldwide attention. Throughout the entire colony the Indian will be found in all the walks of commercial and professional life, from the ordinary laborer coaling ships to the thoroughly educated and trained barrister at law, fighting for the rights of his countrymen. The Afrikander objects, but the Indian insists



Photos by Russell Hastings Millward

MOHAMMEDAN HIGH PRIEST IN DURBAN

SHOEING A MULE AT GREYTOWN, NATAL

that he is also a subject of Great Britain and entitled to the same consideration as his neighbor.

While Natal abounds in resorts where nature is pictured in its gayest colors, there is one place that stands out by itself. That is Amanzimtoti (Sweet Waters), situated about 18 miles south of Durban on the shores of the Indian Ocean, at the mouth of the Amanzimtoti River. Along either bank of this poetic river will be seen many native kraals and a native life that is fascinatingly primitive and picturesque. Just over the hills, about 4 miles from Amanzimtoti, is located the Adams Mission Station, where for over 50 years the American missionaries have trained the natives not only as preachers and teachers, but artisans and day laborers as well.

Near Pinetown, 17 miles north of Durban, stands the old Trappist monastery where that most austere order of the Catholic Church, with its motto "Sub Silentio," solemnly conducts its humble workshops. Here native boys and girls are trained in almost every line of art, science, and industry, and under the silent and gentle guidance of the brotherhood of monks the sable apprentices prove themselves willing and obedient pupils.

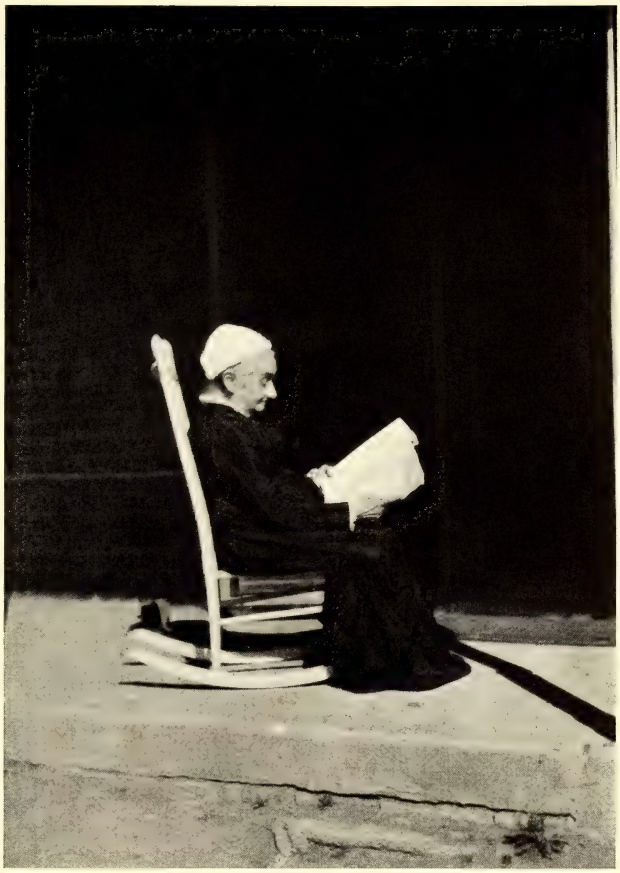


Photo by Russell Hastings Millward

NEARING THE END OF A MISSION: AN AMERICAN MISSIONARY IN NATAL

Pietermaritzburg, the capital, with a population of over 31,000, ranks second in importance to Durban. This city boasts of many public buildings that are of pretentious proportion and excellent design. The town hall is one of the most costly buildings in South Africa, and possesses the fourth largest organ in the world. There are also some notable monuments and statuary commemorating the acts of pioneers, soldiers, and statesmen. The salubrious climate of this district is especially favorable to patients suffering from incipient bronchial ailments, and is one of the most equable on the continent. The quaint Dutch residences scattered throughout the city well merit a visit of the traveler, and convey an excellent idea of conditions under the old Boer regime.

Of the other numerous points of historic interest may be mentioned the battlegrounds at Colenso, Spion Kop, Vaal Krantz, Ladysmith, Elandslaagte, Glencoe, Dundee, Newcastle, Ingogo, Tugela, Majuba Hill, and Laings Nek, where important and decisive battles were fought during the Boer war.

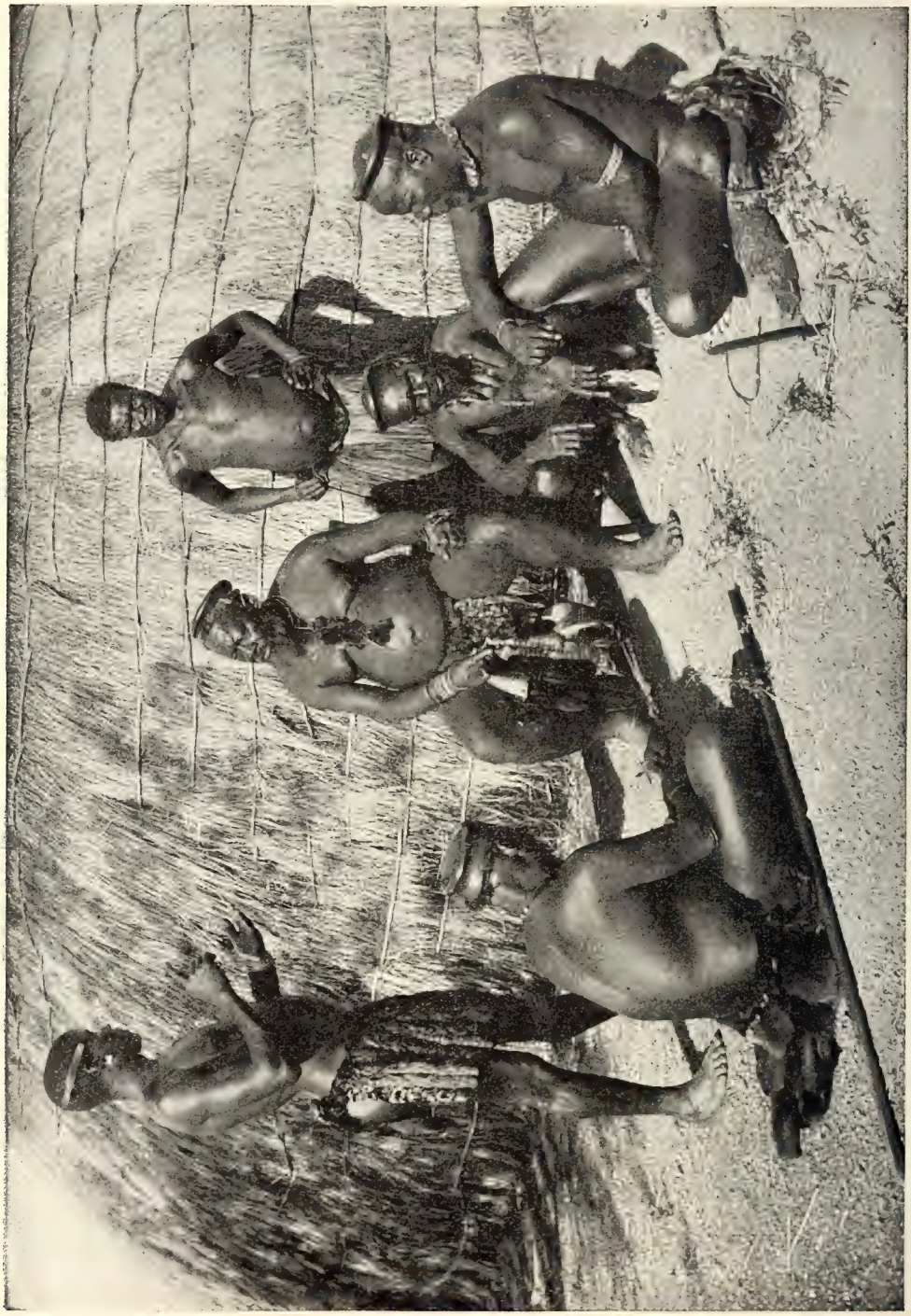
Richmond, where the rebel chiefs were tried and sentenced to imprisonment at St. Helena; Eshowe, the home of Dinizulu, the great Zulu chief; Greytown, the

Photo from Russell Hastings Millward

A ZULU WARRIOR: NATAL

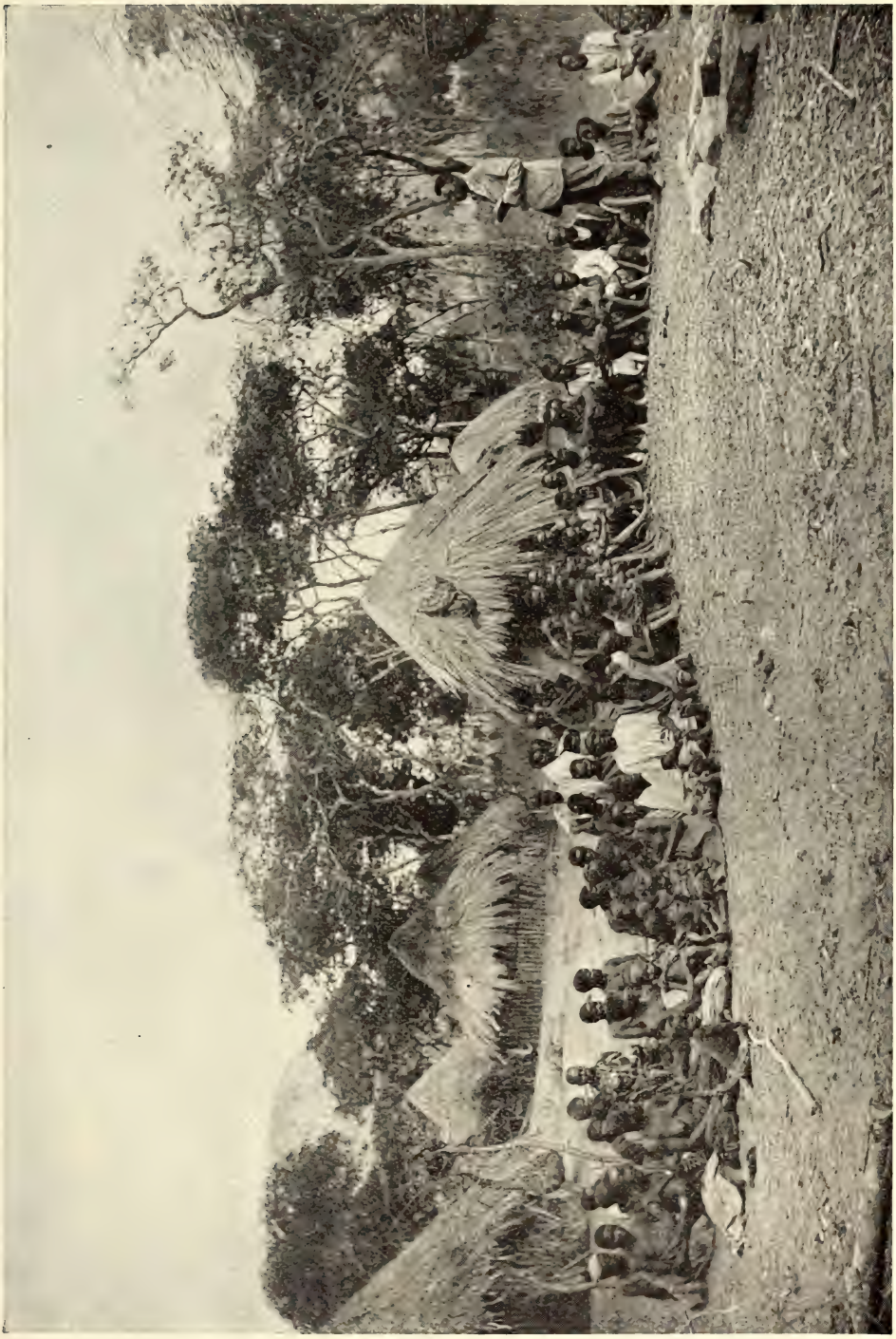
Photo from Russell Hastings Millward

A ZULU WRESTLING MATCH: NATAL



A NATIVE TRIAL IN NATAL

Photo from Russell Hastings Millward



MARK, A NATIVE EVANGELIST, PREACHING IN A KRAAL: NATAL

Photo by E. L. Sechrist

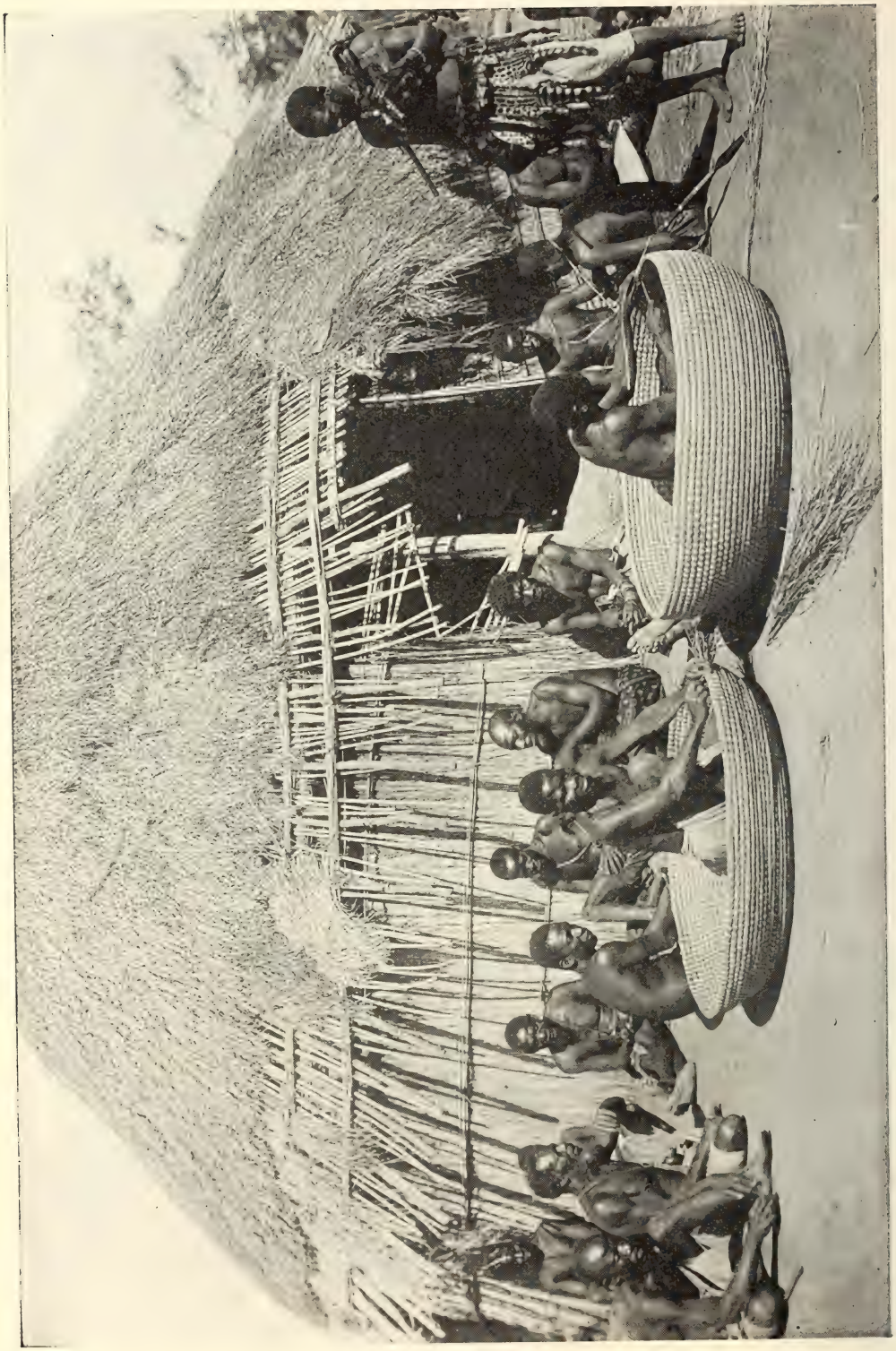


Photo from Bishop Hartzell

NATIVE INDUSTRIES NEAR DURBAN, NATAL

center of the Boer farming district, and the falls of the Umgeni River, at which point the water is dashed over a precipice 360 feet in height, are all points of great interest.

Natal is administered by a governor, appointed by the King of England; a ministry, composed of 6 members; a legislative council, composed of 13 members, appointed for ten years by the governor, with the advice of the ministry, and a legislative assembly, composed of 43 members, elected by voters having a property qualification of £50, or paying rental at the rate of £10 per annum, or having an annual income of £96. For local government there are municipal corporations at Durban, Pietermaritzburg, Newcastle, Ladysmith, and Dundee, and local boards at Verulam and Greytown.

The colony, covering an area of over 36,000 square miles, may be correctly divided into three districts, as follows: The coast district, extending inland for a distance of 15 miles, which is of a semi-tropical nature, and where coffee, sugar, tea, maize, arrow-root, and tobacco are raised; the midland district, where cereals and fruits are grown, and the upper district, where stock-raising is carried on, and where coal, lime, iron, copper, and gold are found. All the soil is of a highly fertile variety, and easily adapted to almost any kind of fruit or agricultural product.

The population of Natal (1906) is given as 1,151,907, including 94,370 whites, 112,126 Indians and Asiatics, 6939 mixed races, and 938,472 natives.

Religion is well provided for by denominational bodies, but there is no aid rendered by the State. Missionary stations, representing nearly every nation and religious denomination, are established in many districts throughout the colony, and are doing much good work among the natives.

There are 34 government primary schools, and a large number of other primary and secondary schools for both European and native children, which are aided and inspected by the government. Schools are also conducted by the missionaries, and largely attended.

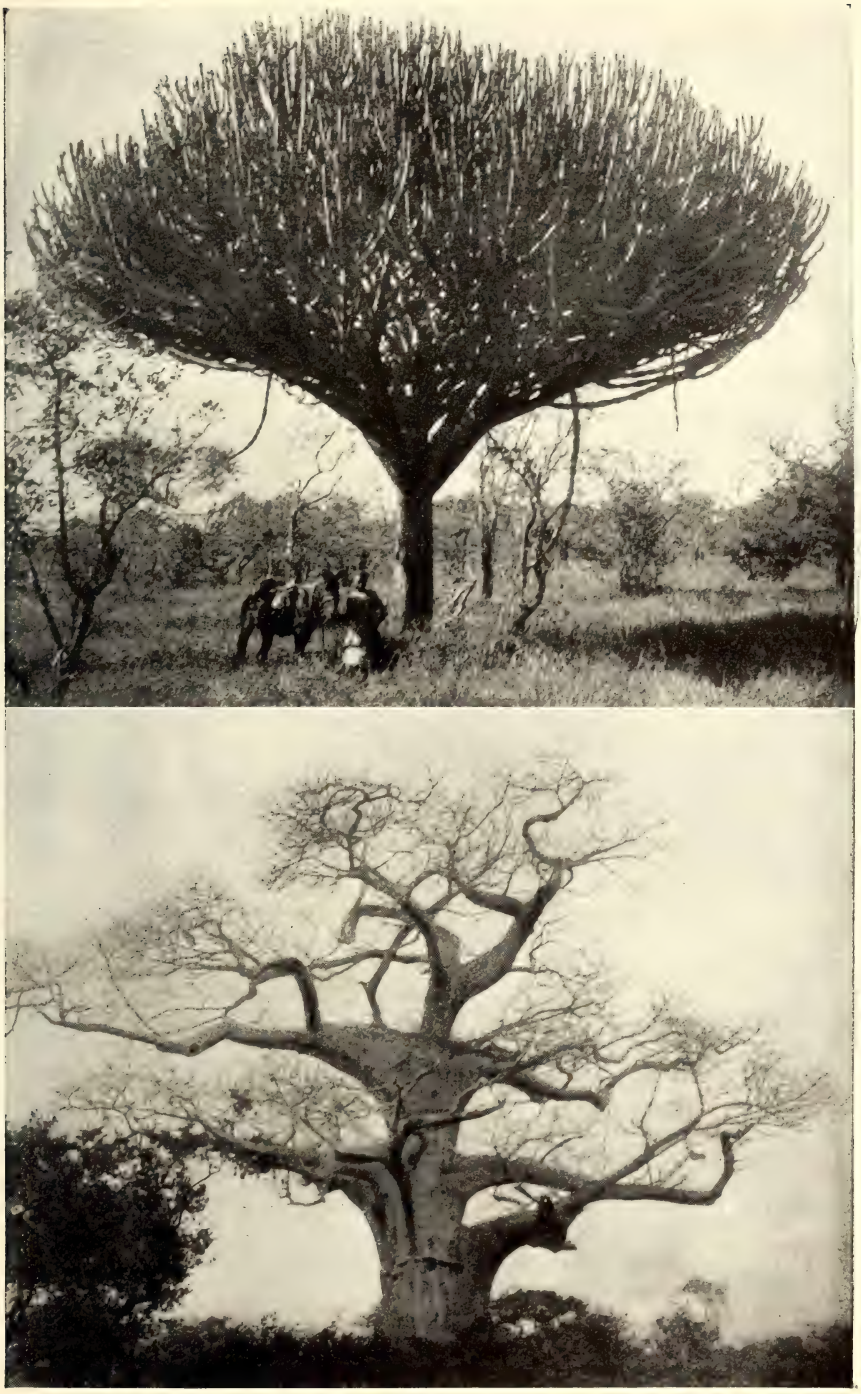
Many of the natives live apart in locations provided for them by the government, about 2,250,000 acres of land being vested for this purpose in the native trust. A native high court administers civil justice and deals with all the political crimes and crimes arising out of native law and custom—ordinary crimes falling under the ordinary criminal law. Natives can acquire the franchise under certain conditions. When brought before a native court, in tribal matters, a native practically pleads his own case before his chief, having no defense, with the exception of his own statements, and accepting such penalty as might be imposed by the court without further appeal.

It has been broadly but erroneously asserted that the native girls are bought and sold in marriage, and this impression should be corrected at once. When a Zulu boy has found his affinity, or rather one of many of them, he declares himself to the girl's father, and is informed how much "lobola" is necessary to effect a legal marriage arrangement. "Lobola" consists in nothing more than a gift of a certain number of cattle, usually 10 to 20, as a guarantee of good faith and evidence that the prospective husband is able to provide. The title to the cattle and their offspring does not pass to the father of the girl, although he receives and holds possession of them, but to the children, for whose benefit the "lobola" is held in trust. Should there be no children, and in the event of the death or divorce of the wife, the cattle are returned to the husband, provided that he has been kind and faithful. If, however, he has been found guilty of any cruelty to his wife, in case of divorce all rights to the cattle are forfeited by the husband and they are held for the benefit of the divorced wife.

Many strange customs and laws obtain in Zululand, but there is no moral code in all the world more rigidly observed than that of the Zulus. Women do practically all of the agricultural work

WOMAN STRINGING BEADS—THE LITTLE FIRE TYPICAL OF EVERY NATIVE STOPPING-PLACE: NATAL

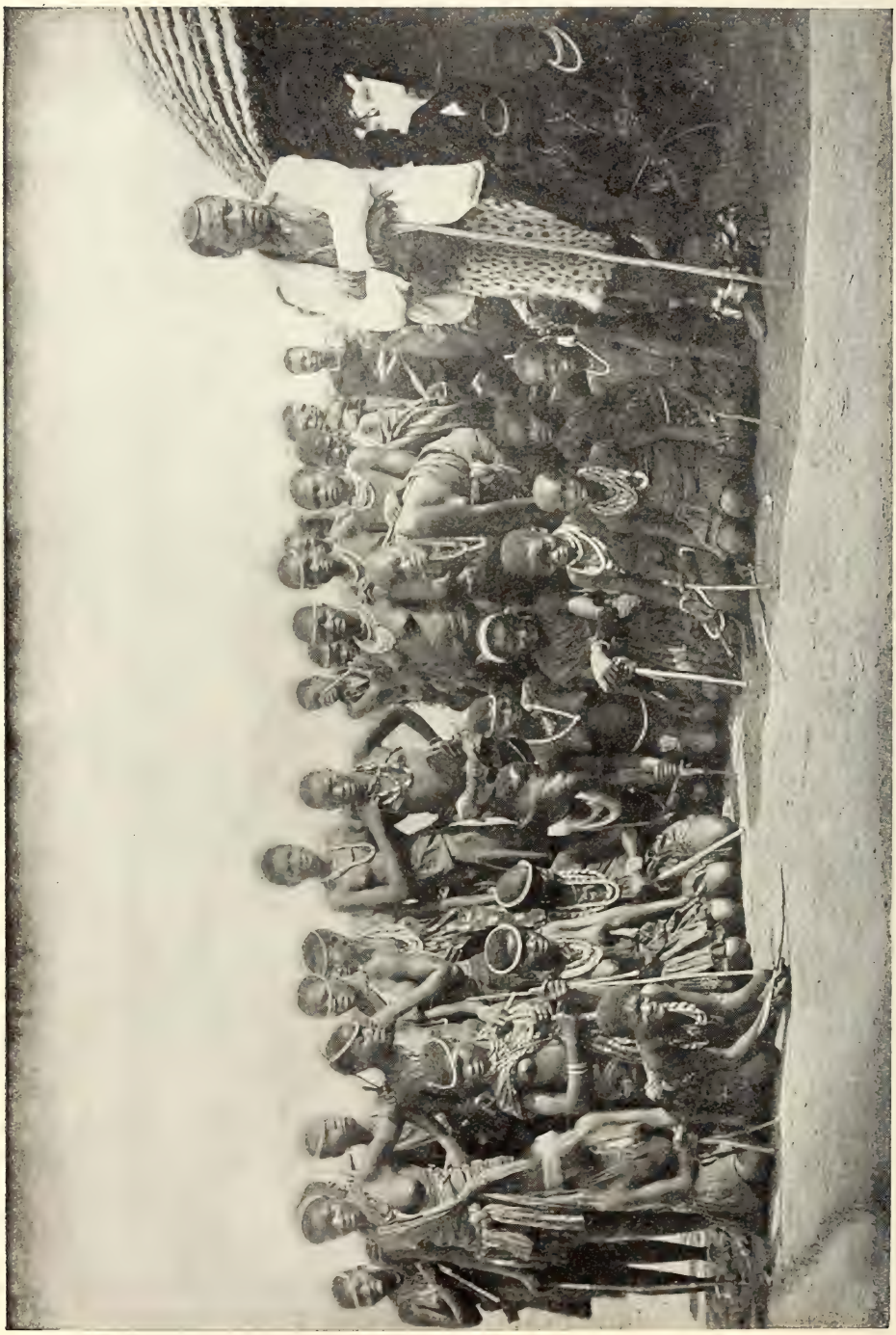
TEMPORARY GRANARY WHILE GRAIN IS DRYING BEFORE THRESHING: NATAL



Photos by Dr C. E. Akeley

TYPICAL TREES IN A SOUTH AFRICAN LANDSCAPE: EUPHORBIA

BAOBAB TREE



A ZULU CHIEF AND HIS WIVES: NEAR BULAWAYO, RHODESIA

Each has her own home, where she has her garden and cares for her children. Scarcely any question in Africa presents more difficulty than does polygamy

and provide for the family, while the men, by tradition, are busily engaged in war or hunting. The women also brew the native beer about which so much has been written by the missionaries. If it becomes necessary for any member of the family to hire out as a domestic, the lot usually falls to the man, as the women seldom leave their native kraals except in groups, and well attended by relatives. Native men are employed in the villages as cooks, waiters, housemen, washmen, messengers, and nurses, and in most cases are superior to women as servants.

Although polygamy is recognized and practiced by the Zulus, each wife is accorded the same consideration and treatment, and the relation between the different wives and their children is harmonious and affectionate. Jealousy, malice or hatred is seldom seen in any character, and no more peaceable and lovable race exists. A man can have as many wives as he can provide for, but he must not look a mother-in-law in the face; and if, by accident, he should come across her, he immediately covers his face and avoids her as graciously as possible. Woman hoes the field and reaps the harvest, but her husband cannot appropriate any part of the grain or stores which she has laid by. It is the wife's duty, however, to provide food for the husband and children, and to otherwise look after the household while the man attends to the cattle. No woman is permitted to cross the paths leading to the kraal where the cattle are kept or to enter the enclosure under any circumstances. Children in the native villages are brought up in an atmosphere of happiness, and discord of any kind is almost unknown in Zululand, except where the white man has forced his commercial invasion.

Few countries have felt the waste, sorrow, and ill effects of war more than Natal; but her people have made a courageous struggle for supremacy, and are today showing the world that "out of adversity springeth prosperity" and that "The Garden Colony" is one of loyalty and a credit to the crown of Great Britain.

THE MAGNETIC SURVEY OF AFRICA

By L. A. Bauer, Director, Department of Terrestrial Magnetism, Carnegie Institution of Washington

ON November 26, 1908, there left Cape Town an interesting and important scientific expedition of the Carnegie Institution of Washington, in charge of Dr J. C. Beattie, director of the Department of Physics of South African College, at Cape Town. Starting out in an ox-wagon and heading in a northwest direction, the party had reached Ookiep, via Calvinia, in the extreme northwest part of Cape Colony, by the end of December.

The purpose of this expedition is to make a series of magnetic observations consisting of the direction of the compass needle with reference to the true north, the dip of the magnetic needle (the south end dipping below the horizon in the Southern Hemisphere), and the strength or measure of the force exerted by the earth's magnetism in compelling a magnetized needle to set itself in some definite direction and not at haphazard. In the regions to be explored but few, if any, similar data have heretofore been obtained, and it was on this account that the Carnegie Institution of Washington decided to support this expedition as part of the general scheme for the magnetic survey of the earth now in satisfactory progress under the direction of its Department of Research in Terrestrial

Magnetism. During the late South African war it was even said that some of the difficulties encountered by the English soldiers in the first campaigns were due to the fact that the available maps either did not give the compass direction or what was given was more or less erroneous, and in consequence the directions followed did not invariably lead directly to the places desired.

In spite of the annoying delays due to breakdowns and the very trying weather encountered—dusty and windy, with temperatures usually over 100° F.—Dr Beattie had succeeded in making the desired magnetic observations at about 20 points between Cape Town and Ookiep, besides securing other geographical data of value.

The projected route from Ookiep is through German Southwest Africa to Windhoek. From Windhoek the overland trip is to be continued to Bulawayo, Rhodesia, and from thence through British Central Africa and German East Africa to Lake Victoria Nyanza, and finally through Egypt to Cairo, where connections will be made with the magnetic survey of Egypt by the British government.

Every facility is being furnished the party by the governing officials of the countries to be passed through, special credentials and passports, free passes on railroads wherever available, etc., being readily supplied. At times there will be required 100 or more porters for carrying instruments, provisions, camp equipments, and other baggage, and it is a pleasure to be able to record, as a token of the general interest being shown in this work, that the Honorable Dr Jameson and Sir Lewis Michell have agreed to contribute $500 toward the cost of the carriers in Rhodesia.

While Doctor Beattie is engaged on the work as outlined, another associate of the Carnegie Institution, Prof. J. T. Morrison, Department of Physics, Stellenbosch, Cape Colony, set out from Cape Town the middle of January to reach points along the southwest coast of Africa as far north as French Congo. He will penetrate into the country from the ports visited as far as available transportation facilities will readily permit; then, returning to Cape Town, he will do similar work on the east coast of Africa, finally joining Doctor Beattie.

Early in 1908 Mr Joseph C. Pearson, a magnetic observer of the Carnegie Institution, en route to magnetic work in Persia and Asia Minor, visited Alexandria, Port Said, and Cairo, and made magnetic observations at each place, his work in Egypt having been greatly facilitated through the kind offices of the British Ambassador, Mr Bryce. Mr Pearson since then, in the course of his work, has passed through Persia from north to southeast, and will most likely secure magnetic data at various ports along the Red Sea toward the end of the present year.

Thus, with the work already accomplished by various governments and with that now in progress under the auspices of the Carnegie Institution, it will not be many years more before it will be possible to map out, with a fair degree of accuracy, the magnetic conditions—for example, the compass directions—over the Dark Continent.

The new vessel of the Carnegie Institution designed for ocean magnetic surveys, the *Carnegie*, now in course of construction at Brooklyn, is expected to be cruising along the coasts of Africa in 1910 to supplement the port data being obtained this year by the observers named above. Furthermore, similar magnetic observations will be made on board the *Carnegie* at sea, so that the lines of equal magnetic declination or "variation of the compass," for example, may be drawn at the same time both over sea and land.

There is thus being rapidly realized for the first time the dream entertained by Alexander von Humboldt three-quarters of a century ago the completion of a general magnetic survey of the globe, embracing both sea and land, within a comparatively short period of time (10 to 15 years), instead of intermittent, non-interdependent, and desultory work spread out over many decades.

Photo from C. F. Friend

NATIVES TAKING BARK TO GOVERNMENT HOUSES IN WINDHOEK, IN GERMAN SOUTHWEST AFRICA

The houses are lined with mats of bark. German Southwest Africa is as large as the states of California, Colorado, and Washington combined. It has an estimated population of 200,000, of whom about 7,000 are whites; 4,600 of these are German soldiers. The whole southern part and much of the eastern is barren and desert.

A RICH NATIVE AND FAMILY OF ANGOLA

Bordering on the Congo Free State is the Portuguese territory of Angola, a country about as large as France and Switzerland and Italy combined. For every thousand people who have heard of the Congo it is possible that two have heard of Angola, and perhaps one of those two knows that from a time some score of years before the inauguration of the Congo State there has existed in that country a system of slavery which is only comparable with that of the Spaniards in the West Indies. Slaves are brought down from the far interior, often as far as 800 miles, by agents who think they have done well if one-half of their drove survive the journey. At the coast, knowing that it is impossible for them to return home, the slaves bind themselves to a term of service, which never ends, in the cocoa plantations. Angola is a poor country, poor in natural products of the soil and poor in minerals, but still moderately rich in men, in spite of having been squeezed for generations.—A. F. R. Wollaston.

Photo from "The Story of the Congo," by H. W. Wack, G. P. Putnam's Sons, New York

THE "MARIMBO," THE NATIVE PIANO OF ANGOLA

MISSION CHILDREN IN THE CONGO STATE

NATIVE DRUMS IN AFRICA

Photo from E. H. Richards

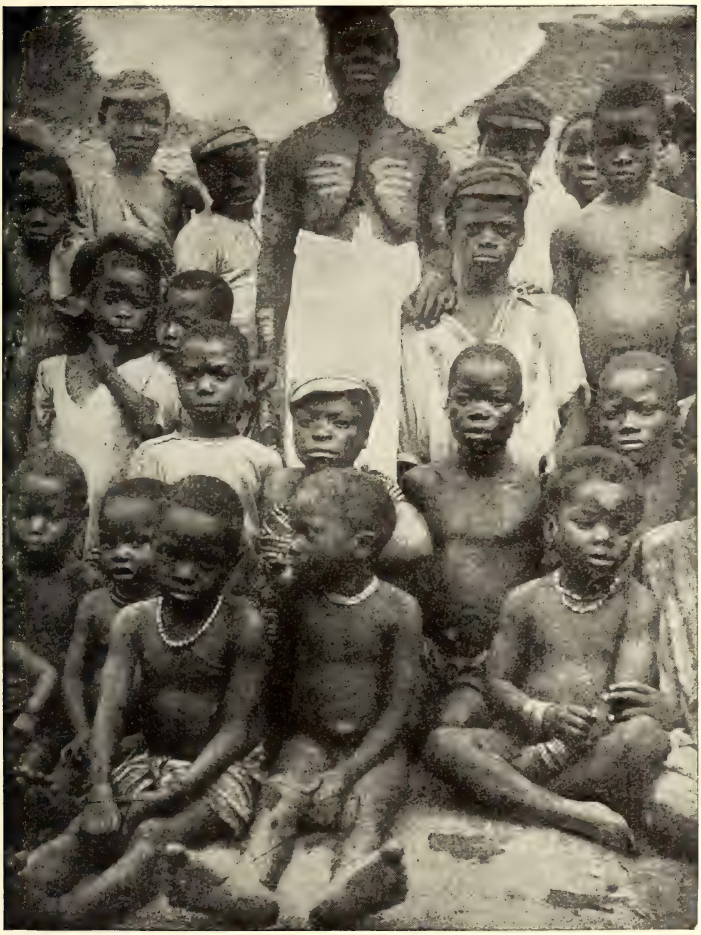
The native drum and the native piano are essential to a good dance

BOASSINE, A NATIVE KING AT KUMASSI, THE CAPITAL OF ASHANTI, ON THE GOLD COAST

The Gold Coast stretches for 337 miles along the Gulf of Guinea. It is about the size of Minnesota and contains a population of 1,500,000, of whom less that 700 are Europeans. The colony is now producing about $5,000,000 in gold annually

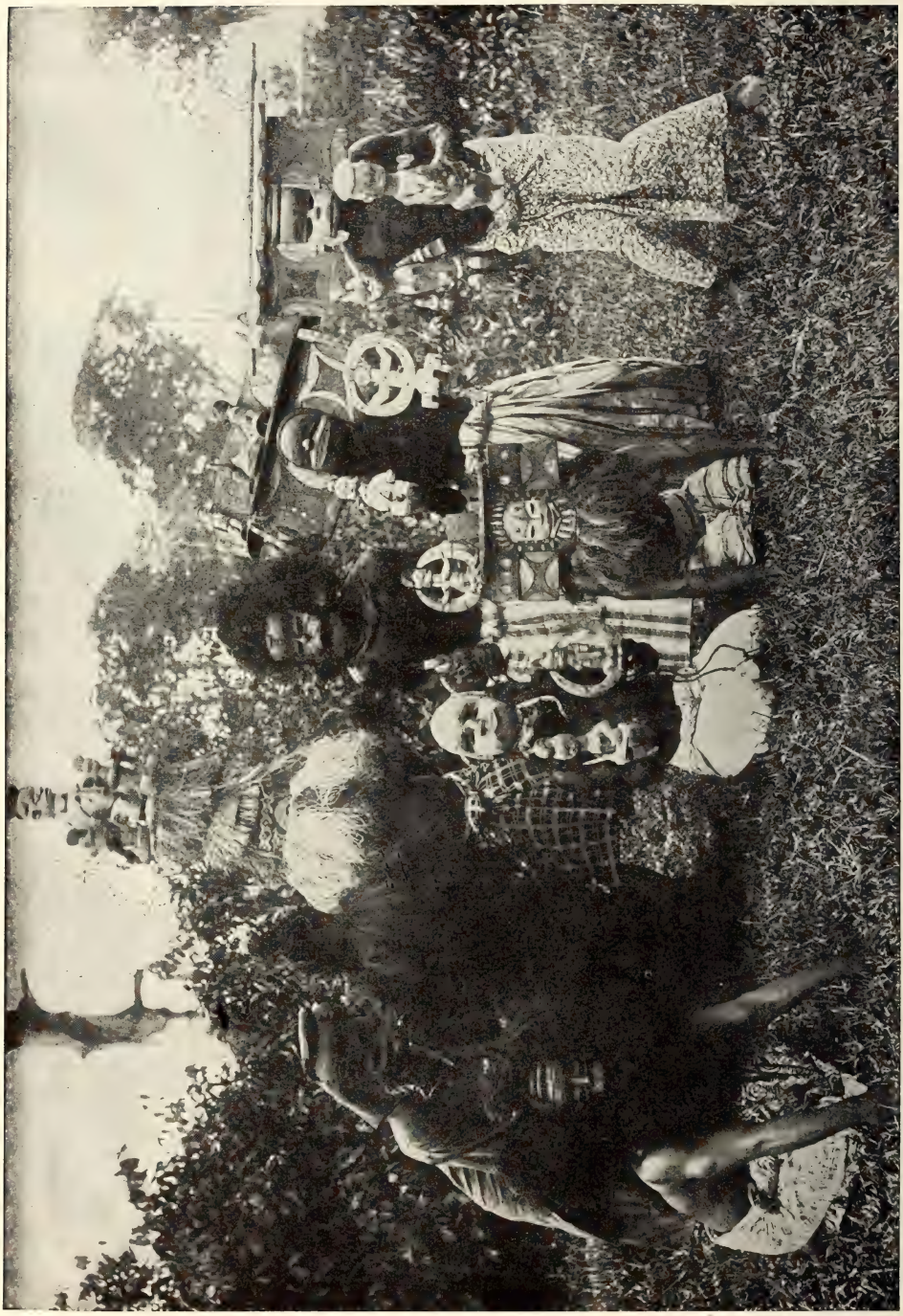
Photo from Dr A. P. Camphor

A KROO WARRIOR WITH CHARMS AND FETICHES, DRESSED FOR A RELIGIOUS PERFORMANCE, LIBERIA



GROUP OF KROO CHILDREN IN MONROVIA, LIBERIA

The Republic of Liberia occupies an area about the size of Pennsylvania, and, according to Sir Harry Johnston, is the most interesting portion of the West African coast lands. In its 43,000 square miles, more or less, are locked up, he believes, some of the great undiscovered secrets of Africa, besides an enormous wealth of vegetable products and perhaps some surprises in minerals. Liberia has a population of about two millions, of whom approximately one hundred and fifty thousand live along the coast and may be called civilized. There are only about fifteen or twenty thousand Americo-Liberians who are descendants of the American Negroes who were shipped back from the United States and the West Indies in the early part of the last century. These descendants are reported to be much less vigorous than the native stock. A fringe of land varying from ten to fifteen miles along the coast is cleared and settled, but the interior is for the most part covered by the great primeval African forest. The rainfall in portions of the Republic averages one hundred inches annually. See "The Black Republic—Liberia," by Sir Harry Johnston and U. S. Minister Lyon, in NATIONAL GEOGRAPHIC MAGAZINE, May, 1907.



A COUNTRY "DEVIL" PLAY IN A LIBERIAN TOWN

Photo from Bishop Hartzell

Photo from J. B. Magill, Monrovia, Liberia

COUNTRY DEVIL PLAY IN A LIBERIAN TOWN WHEREIN GIRLS ARE TAKEN OUT OF GREGREE BUSH, WASHED AND PREPARED FOR MARRIED LIFE ACCORDING TO NATIVE CUSTOM

BUYING A BRIDE'S BOXES FOR HER WEDDING TROUSSEAU: TUNIS

RESTING IN THE DESERT

Photo and copyright by H. C. White Co.

IN CIVILIZED FRENCH AFRICA

By James F. J. Archibald, F. R. G. S.

EXPLORATION parties and travel writers seem to have quite overlooked the fact that the Dark Continent has its light spots as well, and that for the past sixty years the French people have been establishing colonies in northern Africa that are today models, well worth the serious study of nations supposed to be the great colonizing forces of the world.

When I made my first trip into Africa from Zanzibar it was exactly as I had expected to find it; my first visit to Capetown or Pretoria afforded no surprises; Dar-es-Salaam, the German East African colony, was just what an African colony should be; and Mozambique afforded all the material for kodak sketches that the most exacting explorer could demand; but my African surprises began when I started a three months' motor trip through Tunis, Constantine, Algeria, and Morocco, and from whence I have just returned.

At first I pitied myself in my supreme ignorance of the truly marvelous work the French government has done in Algeria in the past sixty years and in Tunis during the past twenty years, but since my return, filled with enthusiastic descriptive tales, I have found but two men who knew anything about the wonderful work and especially about the wonderful roads of the French colonies. One of these was a French engineer, who had built some of the roads, and the other was my friend Savage-Landor, who has been everywhere; even he betrayed some surprise with regard to the condition in the more remote parts of the interior. Since my return I have talked to many well-informed people until it has become a sort of a game with me to try to find a third who knows that the best roads of the world today are in Tunis and Algeria—not a few thousand yards of sample roads, but a few thousand miles of main roads and hundreds of miles of minor roads and trails perfectly built by the most skilled engineers of France.

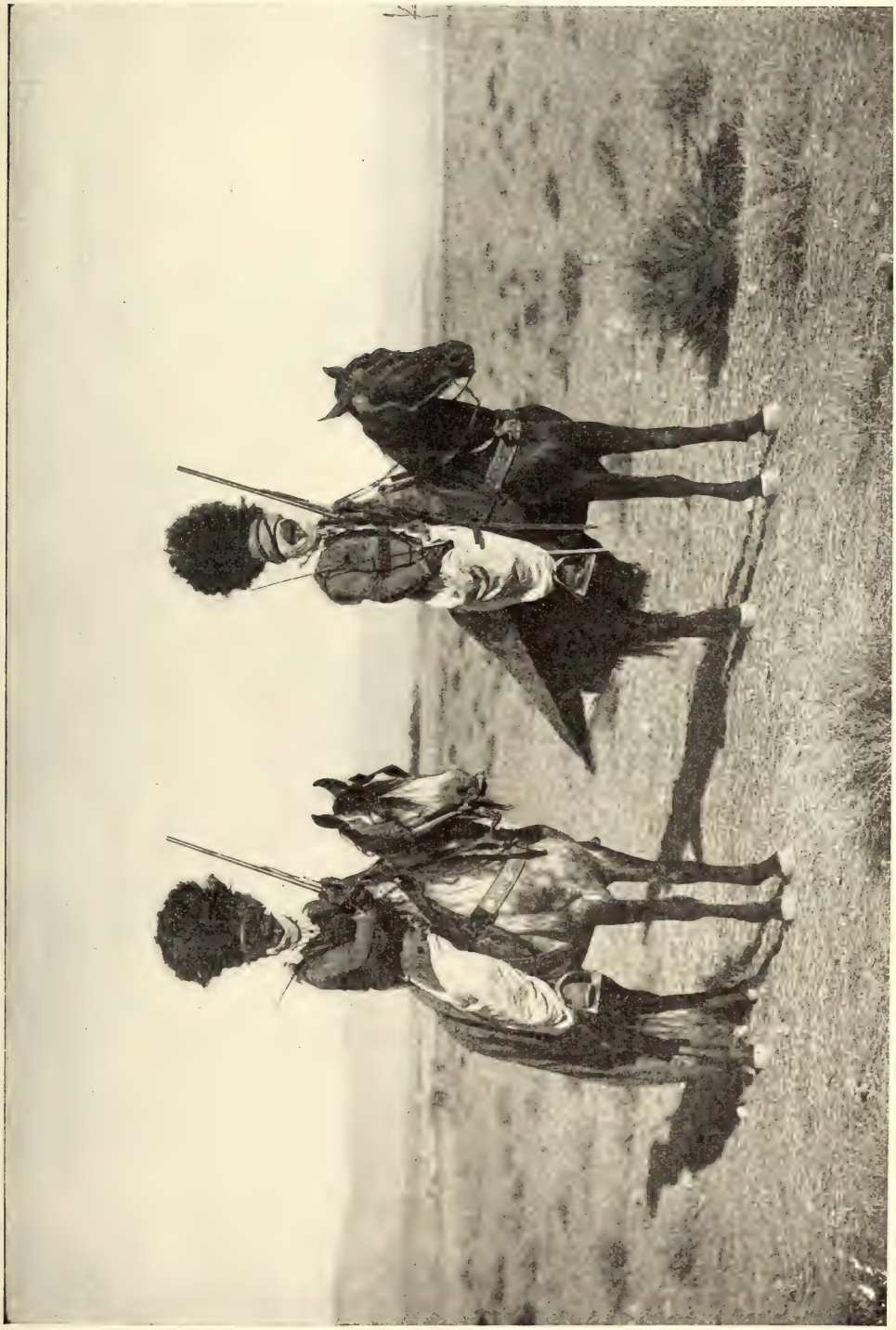
When Count Roger de Martimprey suggested a motor trip through the colonies of northern Africa I immediately thought of the young German officer who has just completed a trip across Africa, and of the tales of his experiences—of building forty bridges within a few miles, of taking two weeks to go one mile, and of waiting six months in one place to send natives to the coast for gasoline. Count Martimprey's grandfather was one of those Frenchmen who led the armies of France and helped conquer the country, and was for many years governor of Algeria, so he assured me that the roads were perfect, but I had not been prepared in my mind for half the wonderful truth.

Good roads are not a source of surprise to a Frenchman, for all their roads are good, but the roads of Algeria and Tunis are as far superior to the French national roads as Pennsylvania Avenue is superior to a Virginia pike. I cannot make the comparison too strong, and I mean it literally when I say that in weeks of motoring we rarely found a road as rough as the new pavement on Pennsylvania Avenue is today. On the outskirts of some of the larger cities, where the traffic was very heavy, we sometimes found a few shallow ruts and traces of wear, but these are repaired constantly.

The roadways of Tunis and Algeria have been projected by the most skilled engineers of France; consequently the grades, curves, tunnels, and water-spans are of the highest order of perfection. There are few roads in French North Africa that could not be used as the way of an electric or steam line without any regrading or leveling. The most important feature of the construction is that they are absolutely straight where the character of the country will permit. A direct line is drawn on the map between two points, and to all purposes that is the

INTERIOR OF A HOUSE IN TUNIS, NORTH AFRICA

Photo from Bishop Hartzell



HORSEMEN IN ALGERIA

Photo from Bishop Hartzell

survey, and that line is followed as closely as possible. The bridges, tunnels, culverts, and, in fact, all stone work, is built for centuries. Some of the mountain bridges are master-works of engineering, spanning gorges of great depth. All of the bridges are of stone, very little steel being used anywhere in the colonies. Wherever it is necessary a wall three and a half feet high and a foot and a half wide flanks the roadway to prevent accidents. These roads are not merely near the larger cities nor are they confined to the seacoast, but they penetrate far into the great desert to accommodate the caravans coming in from the distant oasis of the south.

Along the Mediterranean Sea the aspect of the coast is most forbidding. Between Bougie and Jijelli, a distance in a direct coast line of about 100 miles, a road has been cut out of the solid rock face of the cliff, and with its winding and turning, as it follows each turn of the cliff, it has made the length over 200 miles, and forms perhaps the most wonderful corniche in the world. I have motored from Naples to Spain, and have followed every foot of the Italian and French Riviera, and I have seen nothing that can compare with this Algerian highway. It should also be noted that this wonderful road connects but two towns, with no intermediate village of any importance, and I doubt if the total population of these two towns is 40,000.

No soldier in battle shows more bravery than was shown by the French engineers who first conceived that great work. They have built in a manner that equals in wonder the roads of the Romans, who occupied this same land centuries ago. This corniche will be in use a thousand years hence, when the whole of northern Africa will be as thickly populated as southern Europe is today. The French are building for the future; they are planning a hundred years ahead in everything they do; they are using these great roads as a means of opening the country just as the railroads have opened our great West.

From this road along the coast and from all main highways in Tunis and Algeria are projected a network of minor roads, equally well built, but a trifle narrower, and in the mountain districts trails for animals reach every remote hill and valley. Each one of these trails is as perfectly engineered and as perfectly laid as any of the greater and more important roads. I could not but contrast them with the poor goat paths of our West, dangerous and insecure, to be washed away at every spring freshet. The French government does not wait for a district to become populated before it sends a road or a trail into it, but rather does it invite the settler along a well-laid path into a new field. We have much to learn from France.

The roads of northern Africa are not only well built in the beginning, but they are kept in perfect repair at all times. They are divided into sections of about six or eight kilometers; an overseer or section-boss has charge of these divisions. A well-appointed house is built for the accommodation of him and his family, and his duty does not carry him beyond his own particular section. Each kilometer of road in the colonies is marked by a large square-cut stone, with the distance from the last important town cut in large plain figures, and beside this each kilometer is subdivided by smaller stone markers every ten meters, each one also marked.

Every few miles there is a watering trough where pure water is supplied to the traveler and to his animals. It is built so that even the goat herds can obtain easy access. In the center a spout supplies the drinking water for the people who desire it, and it is no unusual sight, in the dry districts near the desert, to see natives bringing their skin water-bags many miles to carry the water supply back to their houses. These troughs are built of concrete or of stone, and the supply of water is drawn from artesian wells or piped from the mountains.

In the wilder districts the government has built a sufficient number of folds to protect the herds during the night.

The American government might well take the lesson afforded by the French as builders of roads, and after sending a

commission into these northern African colonies build some national roads of our own. I would like to see a movement started to build a national road from Washington to San Francisco in as direct a line as could be laid, and then have it crossed by another from Chicago to New Orleans. Ignore every city or town that did not come in the direct line of survey and allow the various States to connect with it as they wished. With such a foundation this country might soon have roads worth an incalculable amount to every industry. The travelers of the world would forsake the old watering-places of Europe and come to us. This plea should not be made for motorists, nor for horsemen, nor for any particular industry or mode of locomotion, but it should be built as a forerunner of a better intercommunication, for military purposes, and for local travel. It would cost millions, but those millions would be spent entirely among our own people and our own workmen would reap the primary benefits.

Photo by James F. J. Archibald

THE ROAD BETWEEN JIJELLI AND BOUGIE, WHICH HAS BEEN CUT OUT OF THE SOLID ROCK FACE OF THE CLIFF FOR MANY MILES (SEE PAGE 306)

In Tunis and Algeria every adult male inhabitant is taxed three days' work on the main roads and one day on the minor roads. This tax can be worked out or it can be paid in cash at the rate of one franc (twenty cents) per day. In the first two years some discontent was experienced in Tunis, but as soon as the natives saw the results they changed their attitude, and now they gladly do their work, for even the poorest of them realizes the great benefits.

It was not my intention to dwell upon the roads of Tunis and Algeria nor to proclaim this motorists' paradise, but my great admiration for the French as colonists has prompted me to write fully of their work.

During the last fifteen years my work as a war correspondent has taken me into many of the more remote colonies of the world, and during that time I have tried to give the subject of colonial government some study, but not until I visited the French colonies of northern Africa did I find what I considered a most perfect form of colonization, and I now firmly believe that the French people and the French government are today the most practical colonizers of the civilized

INTO THE DESERT SOUTH OF BISKRA

WATER TROUGH, SECTION HOUSE AND ½ KILOMETRE STONE (SEE PAGE 306)

Photos by James F. J. Archibald

A DESERT SCHOOL HOUSE

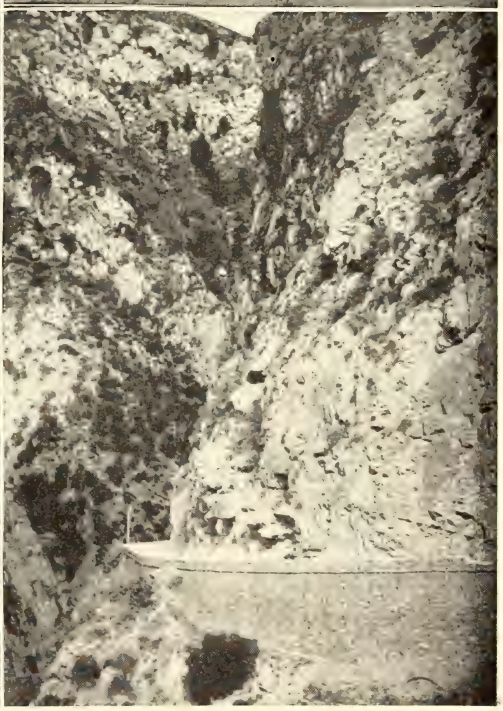
ROMAN RUINS IN TUNIS

A FRENCH SOLDIER IN AN ALGERIAN REGIMENT

Photos by James F. J. Archibald

THE CAID BEN BOU AZIZ, SON OF THE CHIEF OF ALL THE ARABS, BEN GANA

CHILDREN OF ALGERIA



A MOUNTAIN ROAD IN ALGERIA

Photo from Bishop Hartzell

BEDOUIN GIRL AT HOME, NORTH AFRICA

world. England has long been held up as the ideal of colonial perfection, but England colonizes by force of arms. We have prided ourselves on our own recent experiments and endeavors in that line of work. Germany has many model colonies scattered about in various parts of the world, but they could all go to France and study her methods with much benefit.

France does not flaunt the tri-color, the flag of the conqueror, in the face of the vanquished native; they do not meddle with the religions or the customs of the people. They teach the French language to the Arabs, but in return they learn Arabic; they adopt the customs of the natives as well as give them their own. The French regiments on service in northern Africa are uniformed in a dress almost like the dress of the Arab, and in this way they become a part of the people of the country; yet they are always French, and they never lose anything by concessions they make in these customs. The Arab caids are consulted and their advice is given such weight as it deserves. All the public buildings are built in Moorish style, and thus the characteristic architecture of the country is preserved. The school-houses throughout the country are striking examples of this excellent policy on the part of the French.

During the several weeks' motoring in the two colonies I do not think that I saw half a dozen French flags outside the cities of Algiers and Tunis. I state this merely to show that it is not the idea of the French people to continually flaunt their flag in the faces of the natives, but rather to let it be considered an emblem of protection to their rights. The courts are impartial and just, and Frenchman and native alike obtain justice; nor does France impose prohibitive duties upon the products of the countries when she enters the home ports.

The picturesque side of these colonies cannot be overestimated, for the scenery affords everything from the most gorgeous rocky mountains to the great mysterious desert. At Biskra the Arab Caid Ben Bou Aziz entertained us in the "Garden of Allah" and took us far south to Sidi Okba, an oasis upon which stands the shrine of the great Arab warrior who conquered northern Africa in A. D. 680, and where about 3,000 natives live in exactly the same manner as their forefathers did 2,000 years ago. As we wandered through the narrow streets the natives crowded about the chief Bou Aziz, and each one kissed the hem of his burnouse. The only sign of modern civilization I saw in this oasis town was one shop, where a native tailor worked away on Arabic costumes on the ever-present Singer sewing-machine, which has probably penetrated to more remote parts of the world than any one American product. At luncheon, in a pavillion under the date-palm tree, where the sands were carpeted with rare silk rugs, we were served with desert foods, the most curious of all being a small camel roasted whole; also an entire sheep served to be picked to pieces with the fingers.*

Not the least of interest in these northern African states are the old Roman ruins which are being restored and preserved by the French government. At Timgad and Dougga there are better examples of Roman architecture than we find in southern Europe. The theater and baths of Timgad are in a far better state of preservation than anything in Italy.

In all it is an intensely interesting country, easy of access to travelers by train, and especially by motors, for every hotel has its garage. In Algiers we find a city absolutely French in every detail, more French than Marseilles. From that we can go to every degree of civilization and interest, but over it all comes the great thought of the credit due to the French government for its great work.

* See also "Biskra—the Ziban Queen," by Mrs Bosson, with 30 illustrations. NATIONAL GEOGRAPHIC MAGAZINE, August, 1908.

THE BLACK MAN'S CONTINENT

THE pictures published in this number have been selected from several thousand obtained by the Magazine during the past year from all parts of the world. Several of them were sent in by a member of the National Geographic Society in Italian Somaliland; others by Bishop Hartzell, of the Methodist Episcopal Missions in Africa, and for a number the Magazine is indebted to Dr J. Scott Keltie, Secretary of the Royal Geographical Society of London. About 25 are from photographs by Dr C. E. Akeley, of the Field Columbian Museum of Chicago. Dr and Mrs Akeley spent nearly a year in that portion of British East Africa, where President Roosevelt will hunt during the coming months. Dr Akeley was making natural history collections for the Field Columbian Museum, as well as doing some hunting. The largest elephant shot by Mrs Akeley is shown on page 244.

The principal object of the map, published as a supplement, is to show the commercial development of the continent. Our original purpose was also to give the tracks of the great African explorers, but the continent has been so repeatedly traversed from sea to sea in so many directions that if the explorers' routes had been shown we would have been obliged to omit nearly everything else from the map, and would also not have had room for all the routes.

Perhaps the most interesting feature of the map are the red lines showing the net-work of telegraphs in many sections. The reader will probably be particularly surprised by the great number of telegraph lines in French West Africa along the Niger River. The French are pushing the development of this region, and at the same time building a magnificent harbor at Dakar which, in a few years, will be the best harbor on the West African coast. It will be noted that the Cape to Cairo Telegraph line requires only a few links for completion.

All parts of the continent with the exception of Morocco, Abyssinia, and the Spanish and Portuguese territory, are now being exploited by the European merchant and engineer, assisted by American free-lances. Morocco probably offers greater possibilities than any other section of Africa, and before long will be compelled to yield to the commercial invasion. The Portuguese possessions of Angola and Portuguese East Africa are very rich in minerals, timber and forest products, but the little kingdom which controls them is not able to do much for their development.

The Dark Continent has nearly three times the area of the United States and Alaska. Upon it you could place Europe, the United States and Alaska, and then add the Chinese Empire. It is within a few square miles as large as North America, Argentine, Brazil, and Peru combined, but in spite of its tremendous size it has a coast-line of only about 15,000 miles, whereas the coast-line of little Europe exceeds 19,000 miles. As its coast-line is thus nearly as monotonously regular as a circle, its natural harbors are very few and far between. Two-thirds of its area lies within the tropics and has the sun vertical twice a year, while the remaining one-third is practically all subtropical.

Africa differs from every other continent in that it has no great mountain chain, as the Alps in Europe, the Himalayas in Asia, and the Rocky Mountains in the Americas. The African mountains form very small groups at great distances from each other. But on the other hand, the average elevation of Africa is 1,900 to 2,000 feet, while the average elevation of Europe is only 1,000 feet and of Asia 1,650. The reason of this is that the great bulk of the African continent is a plateau of from 500 to 2,000 feet elevation. There is a rim of lowland around the coast, but one hundred miles or more inland the continent rises abruptly. As a result the great rivers which on the map appear to afford such splendid highways for commerce are choked by impassable cataracts only a few miles from the seaboard. For instance, 200 miles of unnavigable cataracts block the Congo only 150 miles from the sea. After these cataracts are passed the river offers more than 1,000 miles of splendid waterway into the heart of Africa.

*Area and Population of Africa**

	Area in square miles.	European population.	Native population.
British Africa	2,765,000	1,070,000†	32,000,000
French Africa	3,890,000	825,000‡	33,000,000
German Africa	933,000	11,200	11,700,000
Italian Africa	188,500	4,500	850,000
Portuguese Africa	790,000	4,000	5,000,000
Spanish Africa	169,000	600	270,000
Turkish Africa (Tripoli)	399,000	5,000	1,000,000
Egyptian Africa (including Anglo-Egyptian Sudan)	1,010,000	117,000	13,080,000
Congo State	900,000	3,000	30,000,000
Morocco	219,000	3,000	6,000,000
Abyssinia	200,000	1,000	10,000,000
Liberia	42,000	100	2,000,000
	11,505,500	2,044,400	144,900,000

*All figures are approximate.
†Of whom 1,060,500 live in British South Africa and Rhodesia.
‡Of whom 810,000 live in Algeria and Tunis.

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THE NATIONAL GEOGRAPHIC MAGAZINE

HUNTING THE GREAT BROWN BEAR OF ALASKA

BY GEORGE MIXTER, 2D, OF BOSTON

With Photographs by the Author

ON April 8, 1908, my brother, Dr C. G. Mixter, Mr C. R. Cross, Jr., and I left Seattle for Alaska with but a hazy idea of where we were going or what we would find when we got there. We knew that there was a place called Portage Bay on the Pacific coast of the Alaska Peninsula, where there was a small empty shack, and that opposite to it, on the Bering Sea coast, were Herendeen Bay and Port Moller Bay, on the former of which was a coal mine and a camp where the care-taker lived, in company with three horses; this was the region where we expected to find the Great Brown Bear of Alaska, the *Ursus gyas*.

We hoped—for by this time definite knowledge ended—that we would be able to get to the Coal Camp from Portage Bay, where we were to land, secure the use of the horses, transport our outfit to the other coast, and find some men there who knew the country and would go with us as guides. We had already telegraphed to Seward, Alaska, a town some 400 miles east of Portage Bay, engaging a certain Alfred Lowell, who had the reputation of being an excellent hunter and a strong packer, but who, of course, knew nothing of the country where we intended to hunt.

We spent seven days on the steamer *Yucatan,* following the coast back of Vancouver Island, through Seymour Narrows, and then, by the outside passage, straight to Cordova, Alaska, the terminus of the Copper River Railway, which is being built to form an outlet for the rich Copper River region. From here we followed a coast of extreme grandeur to Valdez and Seward, where we landed on the 15th. Seward, like Cordova, was a railway terminal and grew to a large town, but the Alaska Central Railroad was abandoned after penetrating 56 miles inland, and Seward is now nearly a dead town, with half of its houses deserted.

We found Alfred, and the next day the four of us started westward on the steamer *Dora,* a small and unsteady but very seaworthy craft. This part of the journey took us past Kodiak Island, near the middle of which we left the last trees we were to see until our return. To the westward there is nothing larger than alder bushes and scrub willows, which, by the way, will not burn in the open,

but have to be burned in a stove, which we found later to be the most important item in our camp outfit. As we got farther west the scenery grew more and more splendid, but the weather became steadily worse, wind and snow or sleet becoming the rule. Our most interesting point of call beyond Kodiak was Chignik, where there is one of the largest salmon canneries in that region, and where the rocks and snow mountains are particularly fine.

On April 27 we landed at Portage Bay in a blinding blizzard, and settled ourselves in the shack. We had already decided that, even if we could get them, the horses could not pack over the divide through the six or eight feet of snow, so we were rather at our wit's end to know how to get our outfit across. When the weather moderated, Cross and Alfred left us and started to find the Coal Camp, where they arrived after covering a very bad 16 miles.

By good luck they found at the camp a white man named Johnson with a team of four "outside dogs" (so called in contrast to the native dog, and which were in this case part setter and part "just dog," and made excellent pullers), so as soon as Cross, who had gone wholly snow-blind after the trip over the divide, was able to see well enough to take care of himself, Alfred and Johnson left him and came back to us with the dog-team. We were thus able to get our outfit, including a 15-foot cedar canoe, to the Coal Camp after three or four days of good hard work.

Before leaving the United States we had bought of the principal owners of the Herendeen Bay Coal Company the rights to a salmon boat, salvaged the previous year near the mouth of the Herendeen Bay, where there is a station for catching and salting salmon.

The next thing to do was to get our boat, but this was impossible for the present, as there were still 22 inches of ice in Herendeen Bay, and it was not until the 23d of May that we started for our real hunting grounds on Port Moller, and before that time we were fortunate enough to find two men whom we engaged to go with us. One of them, Mike Munson, a Swede, was a trapper, and the other, Andrew, an Aleut native, came as cook. It turned out that Mike knew but little and Andrew nothing at all about the country, but both proved excellent fellows and willing workers. Andrew was from a small Indian village on the Bering Sea coast at the mouth of Bear River, the largest stream we found, which was composed of perhaps 20 "barabaras" or native houses.

The Indians are all Greek Catholics (due to the former Russian control of the country), and are clean, though rather lazy. There are also a few Eskimo who have drifted down from Cape Nome, the southern boundary of their original district, and these are far more industrious than the native Aleuts. We found a small band of them camped at a hot sulphur spring near the shore of Port Moller.

We gradually became accustomed to the sudden heavy wind squalls (known as wooleys) and the incessant rain, which are the rule during May and the first half of June, and soon learned to pitch our tents in the middle of a thick clump of alders and to build wind-breaks around them. Nor did it take long to find a way to arrange our belongings indoors to give plenty of room near the stove for drying racks of alder sticks. It was very early on the trip, too, that we learned the inflammability of the paraffined silk of which our main tent was made, for a defective asbestos ring around the stovepipe set fire to the cloth, so that at least a third of it burned before we could extinguish it.

After this accident we used what was left of the old tent, and added to it an extension about seven feet long, which we christened the portico. The old part, now about nine feet square, we used for a sleeping-room, and put our stove, drying racks, etc., in the portico, which we made from the canvas tarpaulins from our blanket-rolls.

At this work Mike was invaluable, as he had been a sailor and was quite at

MOUNTAIN PEAKS NEAR VALDEZ: THE PHOTOGRAPH WAS TAKEN FROM THE STEAMER

TEAM OF SETTER DOGS AND THEIR WHITE OWNER WITH A LOAD OF OUR DUNNAGE, INCLUDING A SMALL CEDAR CANOE, ON HEIGHT OF DIVIDE BETWEEN THE PACIFIC AND THE BERING SEA

The pass is about 9 miles long from water to water

THREE SCOWS FULL OF SALMON FOR THE CANNERY AT CHIGNIK

LANDING A CALF FROM THE STEAMER AT KODIAK

GROUP OF ESKIMO

AN ESKIMO AND THREE OF HIS CHILDREN

A THREE-HATCH "BIDARKI" OR "KYAK" (NATIVE SKIN CANOE)

These sea-worthy craft are made of sea-lion or hair seal skins, stretched and sewed with sinew over a frame of alder. The natives had just been out to get some of the first of the run of king salmon, one of which is lying on top of the bidarki.

FOUR ALEUT INDIANS GETTING READY TO GO OUT IN A THREE-HATCH NATIVE SKIN CANOE

THE SAME AFTER TWO HAVE GOT ABOARD

THE FOUR UNDER WAY: THE FOURTH MAN IS LYING ON HIS BACK ON THE BOTTOM, OUT OF SIGHT UNDER THE DECK

INDIAN WOMAN AND CHILD AT DOOR OF "BARABARA" OR SOD HUT

The part seen in the picture is only an enclosed passage leading to the main hut, which is out of sight on the left. The village consists of ten or fifteen of these barabaras, in which live 50 or 60 men, women, and children, while unnumbered dogs wander around outdoors.

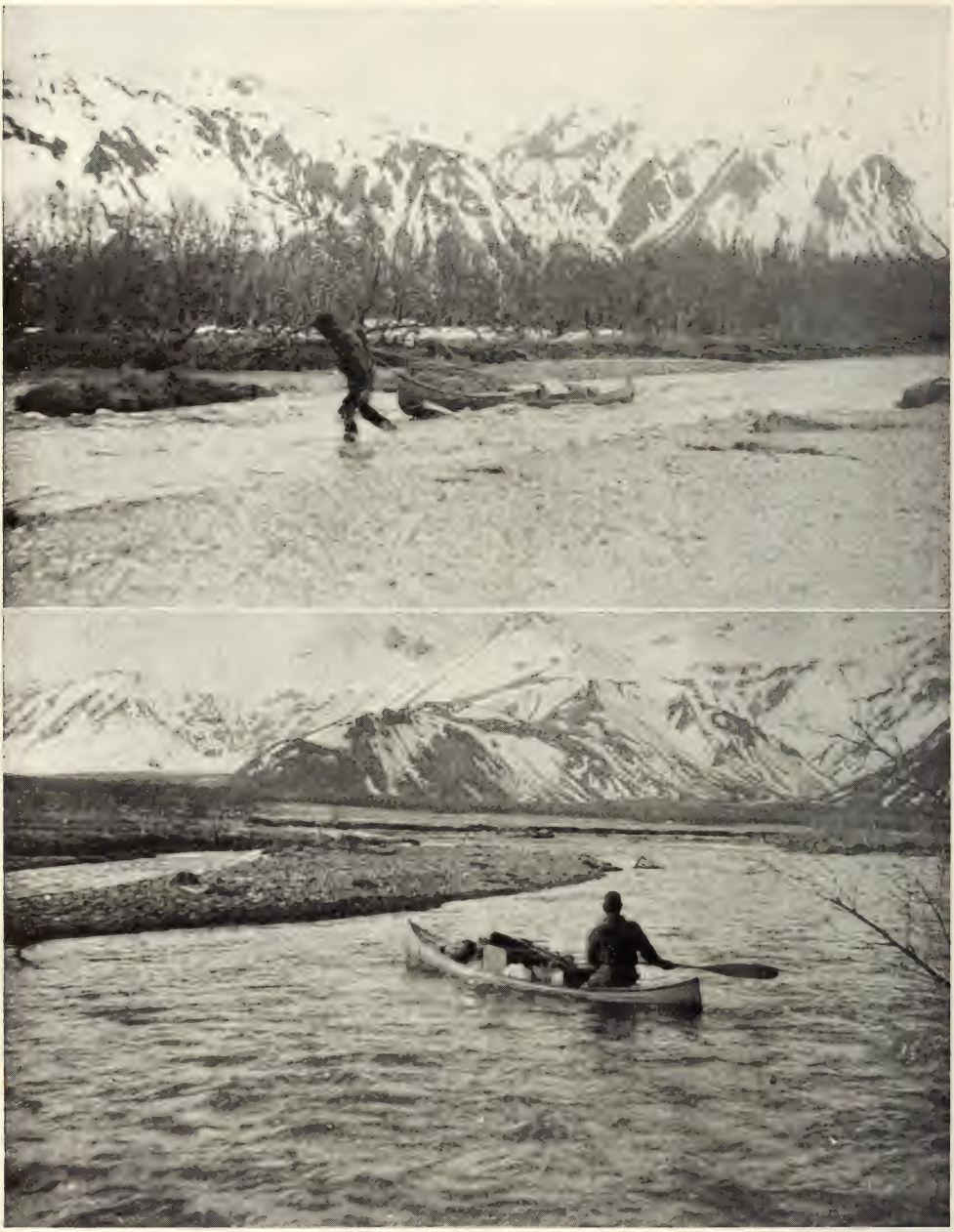
AN ESKIMO AND TWO OF HIS DOGS

TYPE OF HALF-BREEDS SEEN ON THE STEAMER

Their mother was a Siwash Indian and their father a light-haired Swede. The children are dark, with blue eyes and bright red hair.

THE SAME WOMAN AS SEEN ON PRECEDING PAGE

The young hopeful did not like to be "taken," so only an arm and a leg show around his mother's fur skirt



LINING THE CANOE UP-STREAM FROM THE BOAT ON THE SHORE TO THE CAMP

The streams are very shallow and swift, and so full of rocks that this was the only way to get the canoe up-stream

RUNNING LOADED CANOE DOWN-STREAM AFTER BREAKING CAMP

STARTING OFF ON A 40-MILE TRIP TO THE INDIAN VILLAGE AT THE MOUTH OF BEAR RIVER

The meat supply for the camp is seen hanging up in the background

BEAR LAKE PASS LOOKING TOWARD BEAR LAKE VALLEY

This pass extends from Port Moller Bay to Bear Lake Valley, a distance of about eight miles. This picture shows the scanty vegetation and absence of timber characteristic of the Alaska Peninsula.

home with a sail-maker's needle and palm. In fact, although we all worked on it, he was really the one who made the tent habitable. Later he was again invaluable to us as a cobbler, for we found that we had to do most of our hunting in rubber boots on account of the wet, and the daily mountain climbing wore them out very rapidly. Each of the party wore out two pairs of rubber boots and two pairs of "shoe packs" (shoes with rubber feet and leather tops, theoretically water-proof to the knee), and when they were gone Mike cut off the legs of the rubber boots, which were still whole, and sewed them to some ordinary tramping boots which we had up to that time found no use for.

Our menu was very good most of the time, for the country contained quantities of caribou, Arctic hare, porcupine, and ground squirrels, besides ducks, ptarmigan, small shore and land birds, and an occasional goose and white swan. Of course the bay swarmed with gulls, and we found their eggs excellent and easy to gather, for, although Port Moller Bay is 10 miles long and four or five wide, it contains only two very small islands, and these are literally covered with gulls' nests. Our principal staple when we left the neighborhood of Gull Island was caribou meat, and we found it very good and that we did not tire of it as quickly as is the case with most game. The liver, eaten within twelve hours from the time the animal is killed, as is possible under these circumstances, is far better than the calf's liver one gets in the market, and is, in fact, entirely different in flavor.

We had with us, of course, such staples as flour, sugar, baking powder, corn and oat meal, rice, salt, tea, bacon, and dried fruits, the latter being very acceptable in the absence of fresh vegetables.

The country is very rugged, and during the early weeks of our trip the heavy snow, soggy with the rain and fog, made hunting very difficult, especially as the bears kept well up to the tops of the mountains until the snow left the slopes bare, and they could browse on the young grass and alder buds lower down. We were soaked with the rain from morning until night, and the streams, fed by the melting snow and glaciers, are often waist deep and must be waded many times a day. They are so swift and rocky, however, that we had to tow the canoe up when we transported our dunnage from the boat to camp, and even running down we always prepared for a capsize and were seldom disappointed.

The method of hunting was, to the uninitiated, rather curious. We left camp about 7 o'clock and made ourselves comfortable on the first knoll which gave us a good view of the surrounding country. Here we spent from half an hour to two hours examining every foot of the country in sight with our field glasses, which were good binoculars, to discover a bear or some fresh tracks in the snow-fields. The bear were generally two or three miles away when first seen, and a long stalk, sometimes lasting four or five hours, followed, the shots being made at distances ranging from 50 to 350 yards.

If nothing was seen from the first lookout, we moved some miles to another and repeated the same tactics, the total country examined in a day by the whole party (which usually went out in two divisions, one taking Alfred and the other taking Mike) being enormous, although we seldom traveled more than 15 miles.

On one occasion, very early in the season, I was out with Alfred, and about 10 in the morning sighted a bear and a cub playing in the snow on the top of a ridge perhaps 300 feet above the valley floor. Our stalk was a difficult one, first over snow and then over slide-rock, where the slope was so steep that it was quite bare. Although the temperature was several degrees below freezing, we stripped to our undershirts and were dripping with perspiration before we reached the crest by the opposite slope from the bears. They had not gone far, and were about 75 yards away and below us. Between us and them we saw a hole in the snow, which turned out to be the den which they had just left after

A TYPICAL CAMP

The tents were always pitched in the middle of a clump of alders to prevent their being blown down. A small space was cleared for this purpose, and the alders which were cut down were then piled to form a wind-break. One of our cubs shows in the foreground, and behind her is a row of three bear skulls set out to dry.

HAIR CUTTING IN CAMP

BEAR HUNTING AS IT IS ACTUALLY PRACTICED (SEE PAGE 324)

Bear hunting grows more difficult as the snow exposes the brown grass, which is nearly the color of the bears. The daily discussion as to which tracks visible on the snow slopes 3 or 4 miles away were there the day before.

FRESH-KILLED BEAR

He stood 5 feet from the sole of his fore foot to the top of his back (not including the fur). He weighed about 800 pounds. A grizzly bear weighs half as much

BEAR PARTLY SKINNED

This bear had a rear foot measuring 16⅝ inches from the heel to the base of the second toe-nail, and the fore pad was 11½ inches broad

FRESH-KILLED BEAR

The unstretched hide of this bear measured 11 feet 4 inches from the tip of the nose to the base of the tail

THE SAME BEAR: HIS STANDING HEIGHT WAS 4 FEET 8 INCHES

FOUR BEAR (AN OLD HE, SHE, AND TWO YEARLINGS) SHOT AT ONE TIME BY CROSS AND MYSELF

They were killed at the top of a mountain and rolled some three or four hundred feet down, and had to be dragged together—a rather difficult piece of work—to pose them for the picture.

SKINNING A BEAR

Mr Mixter's party shot 18 bear and brought back every skin

LITTLE WILLIE HAD A BROKEN LEG, AND WAS RATHER A SPITEFUL LITTLE RASCAL

FRITZI AND HER BARREL

The barrel was her home for a week and was then abandoned as too clumsy, after which she, and later her companions, slept in the cook tent with the men.

FRITZI, PAULINE, AND LITTLE WILLIE IN CAMP

FRITZI AFTER DINNER

their winter hibernation, and toward it they were now making their way. The old bear had evidently been warned of some danger, for she drove the cub into the den and continued alone toward where I was sitting with my gun ready.

I let her come to within about 50 yards, when she stopped and looked up, exposing her chest. She was my first bear and looked as big as a house, and it was not surprising, perhaps, that I shot high. She was growling, her mouth wide open, and my shot struck a canine tooth, glancing off without doing any damage, so I fired again with better effect. By this time the cub had heard the racket, so she came out of the den and proceeded to get mixed up in her mother's legs, making it hard to shoot without hitting the little fellow. After

LEADING FRITZI AND PAULINE DOWN TO THE BOAT AFTER BREAKING CAMP

THEY DISAGREE ON THE WAY DOWN

a while I got in another shot, and the old bear went somersaults down the snow slide, much to the horror of the cub, which took one look and made for the den.

Here Alfred followed her, and, with a great deal of trouble, managed to catch her by the ears and carry her squealing and fighting out of the hole. We made a collar of my gun sling and led her down to where the old bear had stopped, and then the heavy work of skinning began. It takes from one to three hours to do this job, and I for one was tired when we got back to camp at half-past 7.

Alfred had packed the skin, which, though not as large as many we got later, weighed 105 pounds, and I led the cub until she gave out, and then packed her the last mile to camp in my coat. After this she and the two others which we caught later lived in the cook tent with the boys, and soon learned to be decent members of society when left quite alone.

When we first caught them we had a good deal of trouble to make the cubs eat. We had neither the time nor the ingenuity to devise a makeshift nursing-bottle, and condensed milk was too much of a luxury to give it to them as a regular diet. This first cub, Fritzi, was the hardest to teach. At first she would slap a dish or spoon out of our hands, or else bite it and pull it away, so we made a thin oatmeal gruel with a good deal of milk and, holding a spoonful just out of reach, waited until the baby's rage got the better of her and she opened her mouth and wailed. Then a well-aimed toss sent a spoonful of gruel into her mouth, and she had to swallow it. It was a long process, but I cannot give any idea of how funny it was, as the noises and antics of this half-human baby are not to be described. After a while, by dint of much coaxing, the cubs learned how good the food was, and after that the mere sight of a dish was enough to set them squealing. In fact, when we were at meals, Fritzi would tease to be fed, and would wail most dismally if no notice were taken of her.

Luckily for all concerned, the men were devoted to the cubs; in fact, the suggestion that they live in the cook tent came from them, and the extra work for all of us caused no grumbling in camp. The cubs, Fritzi, Pauline, and Little Willie, kept well and healthy throughout the trip, and I think the boys were all very sorry when it came time to set sail for civilization and start the "babies" on their long journey to the bear dens of the National Zoological Park at Washington, where they now seem to be quite happy and absolutely at home.

THE ALASKAN BROWN BEAR

MR WILFRID H. OSGOOD, of the U. S. Biological Survey, gives the following account of the Alaskan bears in the last Yearbook of the Department of Agriculture:

Alaska is without a rival in respect to the number and the variety of its bears. They belong to four general types: the brown bears, the grizzlies, the black bears, and the polar bears.

The brown bears are the most numerous and most important. They are of huge size, being much larger than the grizzlies and all other bears except the polar bear and their own relatives of Kamchatka. Therefore the statement, often made, that they are the largest carnivorous animals in the world needs little, if any, qualification. They are confined almost exclusively to the coast region, ranging from Bering Sea throughout the Alaska Peninsula and some outlying islands, and thence south along the Pacific coast nearly or quite to British Columbia. Their color varies greatly, ranging from dark seal brown to buffy brown, the feet, legs, and underparts usually being darker than the shoulders and back. Although the ends of the hairs are often paler than the bases, the silver-tipped effect of the grizzlies is wanting. The front claws are shorter, thicker, and more abruptly curved than in the grizzlies.

It is often said that the brown bears

FRITZI ALWAYS TOOK A NAP AFTER DINNER, SLEEPING JUST AS A BABY WOULD

are less ferocious than the grizzlies, but the evidence is conflicting. Certainly they are more powerful and at close quarters correspondingly dangerous. They come out of hibernation early in the spring, usually in April. When the salmon begins to run they feed largely on them, and on this account have been called fish bears, or fish-eating bears, although other bears have the same habit. They eat a great variety of other food, however, including kelp and shellfish secured about the mouths of streams and along tide flats, and also berries, roots, ground squirrels, and mice, obtained on higher ground.

The brown bears of Alaska will doubtless become very rare or extinct at no very distant date. Such formidable carnivorous animals, even though not inclined to attack human beings, are commonly regarded as a menace to the safety of travelers, and therefore undeserving of protection. Already they have become scarce on Kodiak Island, where formerly very abundant, and on the Alaska Peninsula, though still fairly numerous, they are being killed at a rate probably greatly in excess of their increase. In the heavy forests of southeast Alaska and in the region of Mount Saint Elias they may hold their own longer.

THE PANAMA CANAL*

By Lieut. Col. Geo. W. Goethals, U. S. Army

Chairman and Chief Engineer, Isthmian Canal Commission

The following article was submitted to President Taft by Colonel Goethals, March 16, as a special report on the Panama Canal situation. The report gives such a complete and clear review of why the lock type of canal is being constructed that we publish it in full.

A CANAL connecting the Atlantic and Pacific Oceans has occupied public attention for upward of four centuries, during which period various routes have been proposed, each having certain special or peculiar advantages. It was not until the nineteenth century, however, that any definite action was taken looking toward its accomplishment.

In 1876 an organization was perfected in France for making surveys and collecting data on which to base the construction of a canal across the Isthmus of Panama, and in 1878 a concession for prosecuting the work was secured from the Colombian Government.

In May, 1879, an international congress was convened, under the auspices of Ferdinand de Lesseps, to consider the question of the best location and plan of the canal. This congress, after a two weeks' session, decided in favor of the Panama route and of a sea-level canal without locks. De Lesseps's success with the Suez Canal made him a strong advocate of the sea-level type, and his opinion had considerable influence in the final decision.

Immediately following this action the Panama Canal Company was organized under the general laws of France, with Ferdinand de Lesseps as its president. The concession granted in 1878 by Colombia was purchased by the company, and the stock was successfully floated in December, 1880. The two years following were devoted largely to surveys, examinations, and preliminary work. In the first plan adopted the canal was to be 29.5 feet deep, with a ruling bottom width of 72 feet. Leaving Colon, the canal passed through low ground to the valley of the Chagres River at Gatun, a distance of about 6 miles; thence through this valley, for 21 miles, to Obispo, where, leaving the river, it crossed the continental divide at Culebra by means of a tunnel, and reached the Pacific through the valley of the Rio Grande. The difference in the tides of the two oceans, 9 inches in either direction from the mean in the Atlantic and from 9 to 11 feet from the same datum in the Pacific, was to be overcome and the final currents reduced by a proper sloping of the bottom of the Pacific portion of the canal. No provisions were made for the control of the Chagres River.

In the early eighties after a study of the flow due to the tidal differences a tidal lock near the Pacific was provided. Various schemes were also proposed for the control of the Chagres, the most prominent being the construction of a dam at Gamboa. The dam as proposed afterward proved to be impracticable, and this problem remained, for the time being, unsolved. The tunnel through the divide was also abandoned in favor of an open cut.

THE FIRST CHANGE FROM THE SEA-LEVEL TO THE LOCK TYPE

Work was prosecuted on the sea-level canal until 1887, when a change to the lock type was made, in order to secure the use of the canal for navigation as

* See also "The Republic of Panama," William H. Burr, Nat. Geog. Mag., February, 1904. "The Panama Canal," Admiral Colby M. Chester and Gilbert H. Grosvenor, October, 1905. "The Panama Canal," Theodore P. Shonts, February, 1906.

soon as possible. It was agreed at that time that the change in plan did not contemplate abandonment of the sea-level canal, which was ultimately to be secured, but merely its postponement for the time being. In this new plan the summit level was placed above the flood line of the Chagres River, to be supplied with water from that stream by pumps. Work was pushed forward until 1889, when the company went into bankruptcy; and on February 4 that year a liquidator was appointed to take charge of its affairs. Work was suspended on May 15, 1889. The New Panama Canal Company was organized in October, 1894, when work was again resumed, on the plan recommended by a commission of engineers.

This plan contemplated a sea-level canal from Limon Bay to Bohio, where a dam across the valley created a lake extending to Bas Obispo, the difference in level being overcome by two locks; the summit level extended from Bas Obispo to Paraiso, reached by two more locks, and was supplied with water by a feeder from an artificial reservoir created by a dam at Alhajuela, in the upper Chagres Valley. Four locks were located on the Pacific side, the two middle ones at Pedro Miguel combined in a flight.

A second or alternative plan was proposed at the same time, by which the summit level was to be a lake formed by the Bohio dam, fed directly by the Chagres. Work was continued on this plan until the rights and property of the new company were purchased by the United States.

THE UNITED STATES BECOME INTERESTED

The United States, not unmindful of the advantages of an isthmian canal, had from time to time made investigations and surveys of the various routes. With a view to government ownership and control Congress directed an investigation of the Nicaraguan Canal, for which a concession had been granted to a private company. The resulting report brought about such a discussion of the advantages of the Panama route to the Nicaraguan route that by an act of Congress, approved March 3, 1889, a commission was appointed to—

> "make full and complete investigation of the Isthmus of Panama, with a view to the construction of a canal . . . to connect the Atlantic and Pacific Oceans . . . and particularly to investigate the two routes known respectively as the Nicaragua route and the Panama route, with a view to determining the most practicable and feasible route for such canal, together with the approximate and probable cost of constructing a canal at each of the two or more of said routes."

The commission reported on November 16, 1901, in favor of Panama, and recommended the lock type of canal. The plan consisted of a sea-level section from Colon to Bohio, where a dam across the Chagres Valley created a summit level 82 to 90 feet above the sea, reached by two locks. The lake or summit level extended from Bohio to Pedro Miguel, where two locks connected it with a pool 28 feet above mean tide, extending to Miraflores, the location of the final lock. The ruling bottom width of the canal prism was fixed at 150 feet, increased at the curves and in the submerged channels. In Panama Bay the width was fixed at 200 feet, and in the artificial channel in Limon Bay 500 feet was adopted, with turning places 800 feet wide. The minimum depth was 35 feet, and the locks were to have usable lengths of 740 feet and widths of 84 feet. The commission assessed the value of the rights, franchises, concessions, lands, unfinished work, plans, and other property, including the railroad of the New Panama Canal Company, at $40,000,000.

By act of Congress, approved June 28, 1902, the President of the United States was authorized to acquire, at a cost not exceeding $40,000,000, the property rights of the New Panama Canal Company on the Isthmus of Panama, and also to secure from the Republic of Colombia perpetual control of a strip of land not less than 6 miles wide, extending from the Caribbean Sea to the Pacific Ocean, and—

> "the right . . . to excavate, construct, and to perpetually maintain, operate, and protect thereon a canal of such depth and capacity as

will afford convenient passage of ships of the greatest tonnage and draft now in use."

In event the provisions for the purchase and for securing the necessary concession from Colombia could not be carried out, the President was authorized to secure the rights necessary for the construction of the Nicaraguan Canal.

The law also provided, after the foregoing arrangements had been perfected, that—

"the President shall then, through the Isthmian Canal Commission . . . cause to be excavated, constructed, and completed a canal from the Caribbean Sea to the Pacific Ocean. Such canal shall be of sufficient capacity and depth as shall afford convenient passage for vessels of the largest tonnage and greatest draft now in use, and such as may be reasonably anticipated."

To enable the President to carry out these provisions certain sums were appropriated and a bond issue, not to exceed one hundred and thirty millions of dollars, was authorized. By this act Congress, in accepting the estimates accompanying the report of the commission of 1901, adopted the type proposed by the board, or a lock canal.

Pursuant to the legislation, negotiations were entered into with Colombia and with the New Panama Canal Company, with the end that a treaty was made with the Republic of Panama granting to the United States control of a 10-mile strip, constituting the Canal Zone, with the right to construct, maintain, and operate a canal. This treaty was ratified by the Republic of Panama on December 2, 1903, and by the United States on February 23, 1904.

The formal transfer of the property of the New Panama Canal Company on the Isthmus was made on May 4, 1904, after which the United States began the organization of a force for the construction of the lock type of canal, in the meantime continuing the excavation by utilizing the French material and equipment and such labor as was procurable on the Isthmus.

THE INTERNATIONAL BOARD OF EXPERTS

The question of a sea-level canal was again agitated, and secured such recognition that the President convened an international board of engineers, consisting of 13 members, to assemble at Washington on the 1st day of September, 1905, for the purpose of considering the various plans for the construction of the canal that would be submitted to it.

The plans submitted may be briefly summarized as—

(1) That of the commission of 1901, which has already been explained.

(2) A lock canal with terminal lakes proposed by Mr Lindon W. Bates, and for which three projects were proposed. The one which he appeared to favor contemplated a summit level of 62 feet above the sea, created by a dam at Bohio, and an intermediate level of 33½ feet above mean tide, effected by a dam at Mindi. This plan provided four locks—at Mindi, Bohio, Pedro Miguel, and Sosa. A variant of the plan contemplated a dam at Gatun instead of at Bohio, showing that, at least for a 30-foot head, the Gatun location was not considered by him as unfavorable or offering any difficulties respecting the foundations. His other plans were modifications of this, the summit levels being 27 or 62 feet, but in each instance the lock type was advocated.

(3) The plan proposed by Mr Bunau-Varilla carried out the ideas of the first French company, namely, the construction of a lock canal with a summit level 130 feet above mean tide, to be ultimately converted into a sea-level canal, or what he calls the Straits of Panama. The locks were to be constructed so that as the levels were deepened by dredging they could be eliminated, navigation continuing during the enlargement and transformation. The material removed by the dredges was to be deposited in the lake formed of the upper Chagres River by a dam at Gamboa, and any suitable locations in the various pools between the locks. In commenting on

this plan the Board of Consulting Engineers concluded that—

"After a full and careful consideration of all the features of Mr Bunau-Varilla's plan, the board is of the opinion that it should not be adopted for the Panama Canal for the following reasons:

"1. The construction of the large locks required under the present law and necessary for the accommodation of the traffic seeking the canal after its completion makes it quite impossible to complete the preliminary lock canal even nearly within the period stated.

"2. The excessive cost of transformation added to the loss of costly locks and other appurtenant structures required by the preliminary lock canal.

"3. If the lock canal is likely to be retained for many years, it should be made for the most efficient service, and not be encumbered with modifications in lock construction which would prove inconvenient in use."

(4) A plan proposed by Maj. Cassius E. Gillette, a lock canal with a summit level 100 feet above mean tide by the construction of a dam across the Chagres Valley at Gatun.

No sea-level plan was submitted for consideration, so that the board outlined a general plan of its own, and for purposes of comparison adopted as the lock type a 60-foot summit level canal. Two levels were used; the summit level was carried by an earth dam at Bohio, and the intermediate level by an earth dam at Gatun, each dam sustaining a head of 30 feet. It is to be noted that no difficulties were anticipated in the construction of these dams, and there was no dread or fear of the foundations.

As the result of its deliberations, the board submitted a majority report and a minority report signed by five of its members, the former advocating a sea-level canal and the latter a lock canal, with the summit level 85 feet above mean tide.

THE LOCK TYPE IS ADOPTED

The Isthmian Canal Commission, with one dissenting voice, recommended to the President the adoption of the lock type recommended by the minority, which was also strongly advocated by the then chief engineer, Mr John F. Stevens. The President, in the message to Congress dated February 19, 1906, stated:

"The law now on our statute books seems to contemplate a lock canal. In my judgment a lock canal, as herein recommended, is advisable. If the Congress directs that a sea-level canal be constructed its direction will, of course, be carried out; otherwise the canal will be built on substantially the plan for a lock canal outlined in the accompanying papers, such changes being made, of course, as may be found actually necessary, including possibly the change recommended by the Secretary of War as to the site of the dam on the Pacific side."

On June 29, 1906, Congress provided that a lock type of canal be constructed across the Isthmus of Panama, of the general type proposed by the minority of the Board of Consulting Engineers, and work has continued along these lines. As originally proposed, the plan consisted of a practically straight channel 500 feet wide, 41 feet deep from deep water in the Caribbean to Gatun, where an ascent to the 85-foot level was made by three locks in flight. The level is maintained by a dam approximately 7,700 feet long, one-half mile wide at the base, 100 feet wide at the top, constructed to 135 feet above mean tide. The lake formed by this dam, 171 square miles in extent, carried navigation to Pedro Miguel, where a lock of 30 feet lift carried the vessel down to a lake 55 feet above mean tide, extending to Sosa Hill, where two locks overcame the difference of level between the lake surface and the Pacific. Nineteen and eight-hundredths miles of the distance from Gatun to Sosa Hill had a channel 1,000 feet at the bottom, a minimum channel for 4½ miles through Culebra of 200 feet at the bottom. The balance of the distance varied in width to 800 feet, the larger portion of the entire canal being not less than 500 feet. The depth of water was fixed at 45 feet. The lake assured a perfect control of the Chagres River.

IMPROVEMENTS IN THE ORIGINAL PLANS

Certain changes have been made in the original project, the most important being the withdrawal of the locks from

LOW TIDE NEAR THE PACIFIC TERMINUS OF THE CANAL

The range of tide on the Pacific end is 20 feet, while at Colon it is only one foot

Sosa to Miraflores, which was recommended and adopted in December, 1907. This resulted in a change in the direction of the channel in Panama Bay. A breakwater is being constructed from Sosa to Naos Island which, by cutting off the silt-bearing cross-current, which has always been troublesome, protects the channel against silting.

A second change is the widening of the 4½ miles of Culebra cut to a width of 300 feet at the bottom. This was done by Executive order and was not made on the recommendation of the commission.

A third change is the location of the breakwaters in Colon Harbor. The necessity for these breakwaters was made apparent in the latter part of January, when a storm of some magnitude seriously interfered with shipping. As originally proposed for both the sea-level and lock types, the breakwaters were parallel to the axis of the channel excavated in Limon Bay. If so constructed, sufficient area would not be given to dissipate the waves entering head on into the channel, and they would not afford much, if any, protection to shipping. These breakwaters are to be built out from Manzanillo Island and Toro Point, so as to give a sheltered an-

chorage, and also an opportunity for such expansion to the waves as to break them up.

A fourth change is in the dimensions of the locks. As proposed by the minority they were 900 feet by 95 feet, usable lengths and widths. These dimensions were subsequently changed by the commission at the instigation of the President to dimensions 100 feet wide and 1,060 feet long. The width was again increased to 110 feet on the recommendation of the General Board of the Navy, so as to accommodate any possible increase in beam of future battleships.

SENSATIONAL AND MISLEADING STORIES ABOUT THE GATUN DAM

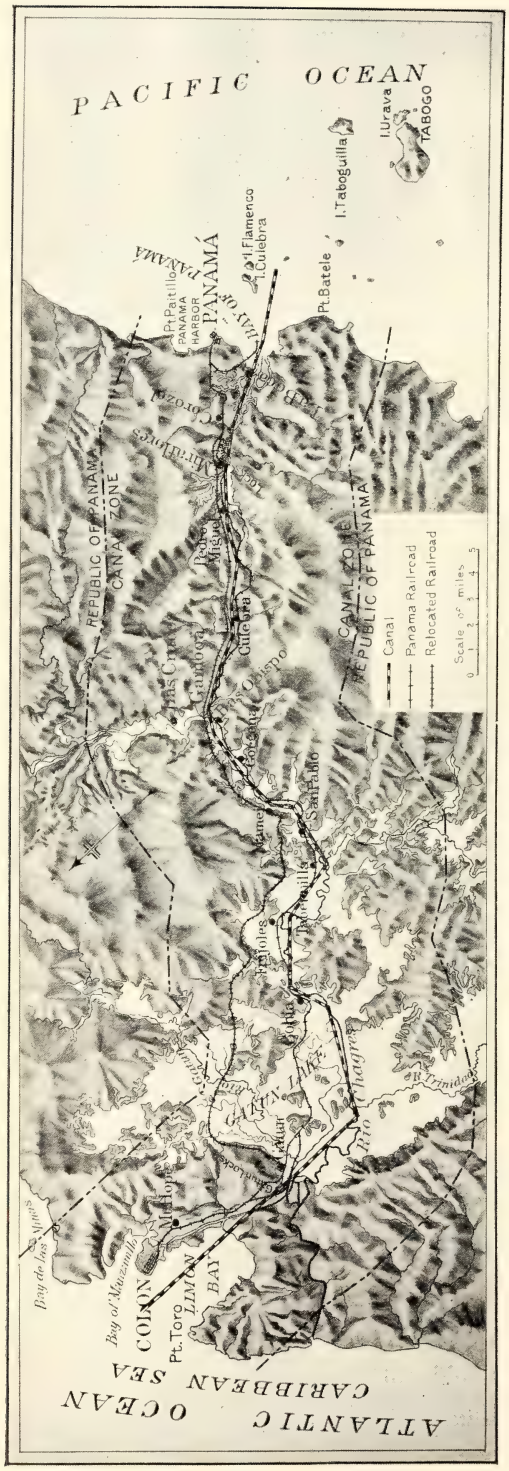
The Gatun dam is to consist of two piles of rock 1,200 feet apart and carried up to 60 feet above mean tide. The space between them and up to the required height is to be filled by selected material deposited in place by the hydraulic process. During the construction of the north side of the south rock pile a slip occurred in November last at the crossing of the French Canal. This was the fifth slip that occurred at this point, the rock settling to some extent, but generally slipping sidewise until the angle of repose was reached. In this connection it is to be noted that the silt deposits in the channel had not been removed. This slip would probably have passed unnoticed, as did the former ones, but for the fact that at the time a flood in the Chagres River had attained such proportions as to cover a portion of the Panama Railroad tracks just south of Gatun. A newspaper correspondent, going from Colon to Panama, saw his opportunity for a sensational story, and attributed the flood to the dropping of the Gatun dam into the subterranean lake under the dam and locks, which another faker had previously discovered, and the news of the destruction of the Gatun dam was cabled to the States.

The slip did not affect the south slope or side of the rock pile. It was entirely local and did not in any way interfere with the work. It would not have occurred had steps been taken during construction to give the proper slope to the rock pile, but economy of time and money did not warrant such precaution. As stated by one of the engineering publications, "We can state from actual personal examination that this incident has absolutely no engineering significance."

As a result, however, the public is told that dire disaster will follow the undertaking unless the present plans are abandoned and the Straits of Panama constructed—that is, a sea-level canal across the Isthmus 500 to 600 feet wide. To accomplish this, however, a lock canal must be built first, and subsequently widened and deepened until the ideal is reached. There is no data available for such a canal. With mountains instead of hills to be removed estimates are, of course, impossible; so the most optimistic figures, suitable alone to the ideal, are offered as a bait. In any event it is also claimed that Bohio should have been selected for the site of the dam in lieu of Gatun.

As between Gatun and Bohio, at both places the distance from the natural surface to the rock is so great that any attempt to found the dam on the last-named material will be attended by enormous expense. At Bohio the gorge in its lower strata is filled with water-bearing gravel, and to make the dam safe the underflow through these strata would have to be cut off by some means extending down 165 feet. No such strata exist at Gatun, so, for this reason alone, leaving out of consideration the advantages in the control of the Chagres River and to navigation by reason of the greater extent of lake, Gatun offers the better site.

Both the majority and minority of the Board of Consulting Engineers considered Gatun a suitable location for a dam; the former adopted it for the typical lock canal used for comparison with the sea-level canal, the latter for the 85-foot summit-level canal. The majority, however, feared the existence of an underground flow in case of the higher dam, but in-



SKETCH MAP SHOWING PANAMA CANAL AND GATUN LAKE

vestigations have failed to disclose any. The great mass of underlying material is not sandy and gravelly deposits, as was supposed, but a mixture of these materials so firmly cemented together with clay as to make the strata in which they occur impervious to water.

THE FOUNDATION OF THE DAM AND LOCKS AT GATUN IS SATISFACTORY

I venture the statement, without fear of contradiction, that the site of no public or private work of any kind has received such a thorough and exhaustive examination and investigation as the foundation of the dam and locks at Gatun. There is no longer a doubt concerning any of the underlying strata; neither the impermeability nor the ability of the foundations to bear the loads that will be brought upon them can be questioned if the data be carefully and impartially examined. The investigations fail to disclose any water-bearing strata or the existence of that underground stream with a discharge equal to the Chagres River itself, which was recently asserted as a fact on the floor of the Senate.

In this connection the statement is also made that the change in the location of the locks at the Pacific end was due to our demonstrated inability to construct the dams, and that as the foundation at Gatun is of the same material, it necessarily followed that the Gatun dam is also impossible of accomplishment.

The majority of the Board of Consulting Engineers in its report states that—

> "The dam at La Boca, between San Juan Point and the Sosa Hill, unless carried down to bed rock at that location, would be placed upon a far worse foundation than that proposed at Gatun or Mindi. The La Boca site is one covered by an ooze of mud or silt, with some sandy material overlying the rock. . . . Unless some feature equivalent to that of a heavy masonry core characterized the design of the dam at this point, or unless a resort be made to dredging down to bed rock or near to it, and refilling with suitable material, or an earth dam at this location be made very massive, it would be in grave danger of being pushed bodily out of place by the pressure due to the head of water in the reservoir."

We found the material in the founda-

GREAT BLAST IN PROGRESS

25 holes; 19.5 tons dynamite; material displaced, 70,769 cubic yards

tions of these dams not only worse than at Gatun, but in nowise comparable. In the former a covering of ooze and silt, in the latter firm ground with a few soft or marshy spots.

THE LOCKS ORIGINALLY PLANNED FOR LA BOCA WERE WITHDRAWN FOR MILITARY REASONS

I know that the La Boca dams could be built to safely withstand the heads of water in the resulting lake by adopting either the method of dredging out the ooze or by giving massive dimensions to the superimposed structure. The engineering committee and the majority of the commission preferred the former method. In either case the cost would exceed the original estimates, and in addition it is a military blunder to push the locks to and beyond the proper line of defense, especially when the canal is a military necessity to this country. That the dams could be built is evidenced by the fact that the west toe of the Sosa-Corozal dam was carried across the valley on the ooze as an embankment for a railroad to be utilized in transporting stone for the Pacific locks. The charge, therefore, that the dams could not be constructed is not true, and the analogy at Gatun does not follow. Nor is there any truth in the statement that the military necessity was an afterthought, as has been insinuated.

I visited the Isthmus in 1905 with a committee of the Board of National Coast Defenses, with which I was as-

sociated at that time, for a study of the defenses of the canal. When the location of the locks at the Pacific end was fixed I was directed to call the Secretary of War's attention to the military necessity of withdrawing the locks to the interior. This I did, with the result that in forwarding the report of the Board of Consulting Engineers to the President he calls attention to the fact as follows:

"The great objection to the locks at Sosa Hill is the possibility of their destruction by the fire from an enemy's ship. If, as has been suggested to me by officers of this department entitled to speak with authority on military subjects, these locks may be located against and behind Sosa Hill in such a way as to use the hill as a protection against such fire, then economy would lead to the retention of this lake. . . . If, however, Sosa Hill will not afford a site with such protection, then it seems to me wiser to place the locks at Miraflores."

In forwarding the report to Congress, the President calls attention to the change recommended by the Secretary of War in the location of the locks on the Pacific side. The so-called afterthought appears, therefore, as a conclusion reached long before I had any connection with the work.

WHY THE GATUN DAM WAS REDUCED IN HEIGHT

Discredit is also thrown on the Gatun dam because there has been a desire to reduce the height from 135 to 105 feet. The original height was arbitrarily fixed to secure an excess of weight, so as to fully compress the underlying material, supposed to be largely silt deposited by the river. Subsequent investigations show that the supposed compressibility does not exist; that a marine, not a river deposit is encountered. The greater the height of the dam the greater the difficulty of constructing the upper portion, and the greater the cost, both in time and money. From present available data, if the lake should take the total discharge of the Chagres River, the water surface would not exceed 90 feet; the top of the locks, 92 feet above sea-level, would permit escape of the water long before it could reach the crest of the dam. Why then go to the expense of the extra height of the dam, and what is to be gained thereby? Assuming the crest of the dam as 100 feet wide, uniform slopes from the rock piles would give a height of 105 feet, and this height was suggested. Because as an additional reason it was mentioned that the pressure over the base would be more uniformly distributed by a dam with the cross-section proposed, the opponents of the present project, without ascertaining the facts, point to the change as a desire to secure a uniform base pressure, and use it as an argument against the stability of the foundation.

Much also has been made of the fact that in the testimony before one of the congressional committees mention was made of securing the stability of the superstructure by balancing the dam on the underlying material. Naturally the testimony is read and discussed in such a way as to leave the impression that the entire dam is to be so constructed. The ground to be covered by the dam is crossed by three water-courses, the Chagres River, the French Canal, and the West Diversion, and between these streams the ground is undulating, Spillway Hill reaching a height of 110 feet above sea-level. It is not remarkable or unprecedented that there should be depressions which undrained become soft with the excessive rainfall. Except for these, the ground is firm. It is in the crossing of these soft spots that slips have occurred and are liable to occur, and to which the balancing method referred. They are relatively small in extent and when drained or filled cause no trouble, as experience at the La Boca embankment clearly proves.

As previously stated, the Gatun dam satisfactorily solves the problem of the control of the Chagres, and there should be no doubt in the mind of any one who impartially examines the data that the solution is not only feasible, but absolutely safe. As there has never been any question raised as to the safety and stability of the dams at Pedro Miguel and Miraflores, with the Gatun dam accepted, other things being equal, the relative

merits of the lock *versus* sea-level canal must rest upon the ease and safety of navigation offered by the two types.

THE SEA-LEVEL TYPE MAKES NO PROVISION FOR CONTROLLING THE FLOODS OF THE CHAGRES RIVER

In the sea-level type offered in lieu of the lock type already described, the Chagres River is controlled by a masonry dam across the valley at Gamboa 4,500 feet long, 750 feet of which is subject to a pressure due to a head of 170 feet during the extreme flood stages of the river. Proper sluice gates are proposed for discharging the river into the canal. The difference in tides is overcome by means of a lock on the Pacific side in the vicinity of Sosa Hill. While provisions are made for damming or diverting some of the streams that would otherwise enter the canal prism, not less than 22 flow directly into the canal, with no provision to control the currents or check the deposits of material carried by them during flood stages.

The prism of the canal is to have a bottom width of 150 feet through the earth sections, or for nearly one-half its length, and a 200-foot bottom width through the rock sections. Nineteen miles of the length are made of curves, so that the proposed sea-level canal is not a wide, straight, and open channel, connecting the two oceans, but a narrow, tortuous ditch, with varying currents of unknown strength, impeded by a lock, and threatened by a dam resisting a pressure due to a head twice as great as that at Gatun.

To be sure, the partisans of the sea-level type are now proposing to eliminate both the Gamboa dam and the tidal lock by making the channel so wide as to reduce the currents that result from the discharge of the Chagres and the difference in tides, but fail to explain how they purpose to control or divert the Chagres, the bed of which will be 50 feet above the water surface of the canal at the juncture. As data is not available for preparing accurate estimates for even such a sea-level type as was originally offered, neither they nor any one else can offer any figures as to time and cost for the construction of such a canal as they now advocate.

In any comparison, therefore, we must confine our attention to the lock type as now building and a sea-level canal as offered by the board of engineers and not by the idealist.

FOR OUR BATTLESHIPS AND SHIPS OF COMMERCE THE LOCK TYPE IS QUICKER AND SAFER

So far as the two prisms are concerned, for ease and safety of navigation the lock type is better because of the greater widths of channels, fewer and easier curves, and freedom from objectionable and troublesome currents, both from the Chagres and its tributaries. This must be admitted by all, but the exponents of the sea-level type concentrate their attention on the obstructions and dangers that the locks constitute in the lock type, and also on the dangers that will result from the failure of the Gatun dam, forgetting that at least equally great disaster must follow the failure of the Gamboa dam. The lock in the sea-level canal is not mentioned, probably because the danger is not so great, since there is but one.

Experience shows that the risks to ships in narrow waterways are material and important. In such a channel as the original Suez Canal the delays and losses to commerce were great, and the danger to ships considerable; although the benefit of the widening is striking, this is true even now.

It is well known that the narrow channels connecting the Great Lakes have been obstructed repeatedly by vessels aground or wrecked in such a manner as to block traffic. Even in the entrances to our seaports there is a frequency of accidents which illustrate the difficulties encountered in navigating narrow and tortuous channels.

Accidents in locks have been relatively few, and none of a serious nature have occurred at the Saint Marys Falls Canal during fifty-four years of its use. The risks to ships in such a narrow waterway as proposed for the sea-level canal at

Panama far outweigh all hazards in the proposed lock canal, provided the latter is built so as to minimize the chance of accident at the locks. This is met by providing every possible safety device, by building the locks in duplicate, and by the installation of a system by which the vessels will be controlled by powerful electric machinery on the lock walls, thus avoiding mistakes on the part of the vessel's crew or engine-room staff, which once led to an accident at the Manchester Ship Canal.

Again, it is objected that the size of the locks limits the canal to vessels which can use them. This is true. The present lock designs provide intermediate gates dividing the locks into lengths of 600 and 400 feet. About 98 per cent of all the ships, including the largest battleships now building, can be passed through the 600-foot lengths, and the total lock length will accommodate the largest commercial vessels now building, which I believe are 1,000 feet long and 88-foot beam.

It is true that ships may increase in size so as to make the present locks obsolete, but the largest ships now afloat can not navigate the present Suez Canal nor the proposed sea-level canal at Panama. It must also be remembered that the commerce of the world is carried by the medium-sized vessels, the length of only one of the many ships using the Suez Canal being greater than 600 feet.

The General Board of the Navy is on record that 110-foot width will be ample for the future needs of the Navy, and naval construction of the future will be limited not alone by the locks of the Panama Canal, but also by the available dry docks. Ships that can not use locks 1,000 feet by 110 feet can not use a 150-foot sea-level canal, nor can this be so easily and economically increased and maintained as is made to appear by its advocates.

Increasing the width of Culebra cut, as recently ordered, from 200 to 300 feet is advanced as an argument to show that the locks are too narrow. Ships do not navigate the locks in the sense that they do the canal prism, and the wider the channel the easier will be navigation. On account of slides that developed in Culebra cut considerably more additional work was made necessary in the upper reaches of the divide than was contemplated, and the advantages of the increased width to navigation were so great, compared with the relative amount of material to be removed in order to secure it, that the President ordered it. By this action the width of the locks is in nowise called into question.

THE GATUN LAKE WILL NOT LEAK THROUGH THE HILLS

The water supply for lockages was so exhaustively treated by the minority of the board that it has not been called into question by any one who has carefully considered the report and data submitted therewith. Recently, however, the theory has been advanced that the water of the lake may seep through the adjacent hills or through the bottom, and is significantly referred to as a mooted question. This possibility is emphasized by the seamy quality of the rock when exposed. The French plans, with Bohio Lake, were the result of careful and protracted study and investigation, and nothing of the kind was anticipated. The commission of 1901 was not in doubt of the resisting power of the hill covering such a flow. The report of the geologist on the general formation of the country does not lead to any such dread or fear. The reservoirs, constructed in the hills of the same geological formation as the entire lake area, are not affected by any such leakage or seepage. At Black Swamp, an extensive area between Bohio and Gatun, the water stands above the level of the Chagres—which is within half a mile—and also above sea-level the level of the water remains unchanged, clearly indicating no such leakage.

Toward the close of the last dry season certain measurements of the Chagres at Bohio indicated a less discharge there than at Gamboa; this was subsequently exploded by other observations which

EXCAVATING FOR THE SITE OF THE GREAT GATUN DAM, LOOKING SOUTH

There are now on the Isthmus forty-eight 95-ton, forty-two 70-ton, ten 45-ton, and one 38-ton steam shovels, or a total of one hundred and one steam shovels

CLOSING OF THE CHAGRES RIVER AT GATUN

A single steam shovel at work on the Panama Canal recently removed 3,941 cubic yards of rock and earth in a working day of eight hours. This breaks all records for a single day's excavation by one steam shovel. The shovel was actually at work 6 hours and 50 minutes.

showed that the first ones were in error. Notwithstanding this, and in spite of the many evidences of the tightness of the earth covering, the possibility of a flow through the hills was advanced and was seized upon as another argument against the lock type.

A SEA-LEVEL CANAL WOULD PROBABLY COST TWICE AS MUCH AS THE LOCK CANAL

The Board of Consulting Engineers estimated the cost of the lock type of canal at $139,705,200 and of the sea-level canal at $247,021,000, excluding the cost of sanitation, civil government, the purchase price, and interest on the investment. These sums were for construction purposes only.

I ventured a guess that the construction of the lock type of canal would approach $300,000,000, and without stopping to consider that the same causes which led to an increase in cost over the original estimates for the lock canal must affect equally the sea-level type, the advocates of the latter argued that the excess of the new estimates was an additional reason why the lock type should be abandoned in favor of the sea-level canal.

The estimated cost by the present commission for completing the adopted project, excluding the items let out by the Board of Consulting Engineers, is placed at $297,766,000. If to this be added the estimated cost of sanitation and civil government until the completion of the work, and the $50,000,000 purchase price, the total cost to the United States of the lock type of canal will amount to $375,201,000. In the preparation of these estimates there are no unknown factors.

The estimated cost of the sea-level canal for construction alone sums up to $477,601,000, and if to this be added the cost of sanitation and civil government up to the time of the completion of the canal, which will be at least six years later than the lock canal, and the purchase price, the total cost to the United States will aggregate $563,000,000. In this case, however, parts of the estimate are more or less conjectural—such as the cost of diverting the Chagres to permit the building of the Gamboa dam and the cost of constructing the dam itself. Much has been said of the disadvantage of the seamy rock in connection with some experiments made at Spillway Hill test pit and of the so-called "indurated clay," yet these same disadvantages apply to the foundation at Gamboa, and the same class of material must be dealt with. The cost of constructing and maintaining a channel through the swamps of the lower Chagres is an unknown factor, and no schemes have been developed for controlling the various streams that are encountered and that must be reckoned with along the route of the canal. So that the sea-level estimates have not the accuracy of those for the lock type.

The majority of the Board of Consulting Engineers estimated that from ten to thirteen years would be required for the completion of the sea-level canal. The Isthmian Canal Commission and the then Chief Engineer fixed the time from eighteen to twenty years. It will take at least six years to complete the dam at Gamboa, and until the control of the Chagres River is assured, little if any excavation can be carried lower than 40 to 50 feet above sea-level; so that, in the absence of anything more definite, the time needed to construct the Gamboa dam is assumed as the additional period needed for completing the sea-level type.

THE COST OF THE CANAL EXCEEDS THE ORIGINAL ESTIMATES BECAUSE OF UNFORESEEN CONTINGENCIES

Much criticism has resulted because of the excess of the present estimates over those originally proposed, arising largely from a failure to analyze the two estimates or to appreciate fully the actual conditions.

The estimates prepared and accompanying the report of the consulting engineers were based on data less complete

than are available at present. The unit costs in the report of 1906 are identical with those in the report of 1901, and since 1906 there has been an increase in the wage scale and in the cost of material. On the Isthmus wages exceed those in the United States from 40 to 80 per cent for the same class of labor. The original estimates were based on a ten-hour day, but Congress imposed the eight-hour day. Subsequent surveys and the various changes already noted have increased the quantity of work by 50 per cent, whereas the unit costs have increased only 20 per cent—not such a bad showing. In addition, municipal improvements in Panama and Colon, advances to the Panama Railroad, and moneys received and deposited to the credit of miscellaneous receipts aggregate $15,000,000, which amount will eventually and has in part already been returned to the Treasury. Finally, no such system of housing and caring for employees was ever contemplated as has been introduced and installed, materially increasing the overhead charges and administration.

DREDGING DEVICES IMPRACTICABLE

Much stress has been laid upon the fact that recent improvements in machinery have so modified conditions that the excavation can be done more economically by special devices in conjunction with dredging than is possible with the methods now adopted. The machines referred to are for shattering rock under water, and, though it is claimed that such devices have given satisfactory results in connection with the Manchester Ship Canal, it is known that similar appliances have failed in certain localities in the United States where they were tried. The variations in the character of the rock on the Isthmus from soft argillaceous sandstone to hard trap are such as to make the use of such devices very problematical. Experience generally has shown that more money can be wasted on subaqueous rock excavation than in the removal of such material in the dry. Experiments are now being made on the Isthmus with one of these rock-crushing devices, but thus far the results are not promising.

PROBABLE EFFECT OF EARTHQUAKES

Much has been written recently concerning the probable effect of earthquakes. The last earthquake of any importance occurred in the seventeenth century, and existing ruins in Panama demonstrate clearly that no shock of any violence could have occurred during the eighteenth or nineteenth centuries. Should an earthquake visit the Isthmus the chances are that the effect upon the Gatun dam would be less disastrous than upon the Gamboa dam. The solid concrete construction of the locks, strengthened by reënforcements, will be as proof against any earth shocks as any structure which man builds anywhere, and the sea-level canal has as much to fear as the lock canal.

The vulnerability of the lock canal in time of war is another argument advanced in favor of the sea-level type, but has little weight, as the sea-level type is equally vulnerable from attacks by land or air in its Gamboa dam as are tidal locks and the various devices for controlling the streams along the route.

THE OPEN DITCH, FROM SEA TO SEA, AN IMPOSSIBILITY

The idea of the sea-level canal appeals to the popular mind, which pictures an open ditch offering free and unobstructed navigation from sea to sea, but no such substitute is offered for the present lock canal. As between the sea-level and the lock canal, the latter can be constructed in less time, at less cost, will give easier and safer navigation, and in addition secure such a control of the Chagres River as to make a friend and aid of what remains an enemy and menace in the sea-level type.

In this connection attention is invited to the statement made by Mr Taft, when Secretary of War, in his letter transmitting the reports of the Board of Consulting Engineers:

"We may well concede that if we could

have a sea-level canal with a prism of 300 to 400 feet wide, with the curves that must now exist reduced, it would be preferable to the plan of the minority, but the time and cost of constructing such a canal are in effect prohibitive."

We are justly proud of the organization for the prosecution of the work. The force originally organized by Mr John F. Stevens for the attack upon the continental divide has been modified and enlarged as the necessities of the situation required, until at the present time it approaches the perfection of a huge machine, and all are working together to a common end. The manner in which the work is being done and the spirit of enthusiasm that is manifested by all forcibly strikes every one who visits the works.

The main object of our being there is the construction of the canal; everything else is subordinate to it, and the work of every department is directed to the accomplishment of that object.

In addition to the department of construction and engineering, there are the departments of sanitation and civil administration, the quartermaster's and subsistence departments, the purchasing department organized in the United States, the legal department, and the departments of examination of accounts and disbursements. Subordinated to, but acting in conjunction with, the commission is the Panama Railroad.

THE CANAL ZONE HAS BECOME ONE OF THE HEALTHIEST REGIONS IN THE WORLD

Too much credit cannot be given to the department of sanitation, which, in conjunction with the division of municipal engineering, has wrought such a change in the conditions as they existed in 1904 as to make the construction of the canal possible. This department is subdivided into the health department, which has charge of the hospitals, supervision of health matters in Panama and Colon, and of the quarantine, and into the sanitary inspection department, which looks after the destruction of the mosquito by various methods, by grass and brush cutting, the draining of various swampy areas, and the oiling of unavoidable pools and stagnant streams.

According to the statistics of the health department, based on the death rate, the Canal Zone is one of the healthiest communities in the world, but in this connection it must be remembered that our population consists of men and women in the prime of life, with few, if any, of the aged, and that a number of the sick are returned to the United States before death overtakes them.

To the sanitary department are also assigned 11 chaplains employed by the commission to attend the sick, as well as to look after the spiritual welfare of the employees. At most of the villages there is a combined church and lodge house, so constructed that the lower floor is used for divine service, while the upper part provides places for meetings of the various lodges. The assignment of time to ministers and to lodges is made by the quartermaster's department.

The department of civil administration exercises supervision over the courts, which consist of three circuit and five district judges; the three former, sitting *in banc*, constitute the supreme court. The district courts take cognizance of all cases where the fine does not exceed $100 or imprisonment does not exceed thirty days. Jury trials are restricted to crimes involving the death penalty or life imprisonment—in short, summary justice rules, and so long as the zone is nothing more nor less than a construction camp this form of law or justice will continue to be the most satisfactory.

The department of civil administration has charge also of the police force, the post-offices, collection of customs and taxes, the issue of licenses, and the public school system. The schools are improved to such an extent that the children of the employees have very nearly the same advantage as in the United States up to and including the high-school courses.

THE LABORERS

The quartermaster's department has charge of the recruiting of labor, the care, repair, and maintenance of quar-

A STREET IN PANAMA BEFORE THE AMERICAN RENOVATION
This street formed one of the plague spots

THE SAME STREET AFTER IT HAD BEEN RECONSTRUCTED BY THE AMERICAN GOVERNMENT

All the streets of Panama and Colon have been renovated in the same manner

A BASQUE FROM SPAIN, WORKING ON THE CANAL

In the month of March, 1909, there were actually at work 31,071 men, 24,911 for the Commission, and 6,160 for the Panama Railroad Company. Of the 24,911 men working for the Commission, 4,278 were on the gold roll, which comprises those paid in United States currency, and 20,633 men on the silver roll, which comprises those paid on the basis of Panaman currency on its equivalent. Those on the gold roll include mechanics, skilled artisans of all classes, clerks, and higher officials, most of whom are Americans; those on the silver roll include principally the common laborers, who are practically all foreigners. Of the 6,160 Panama Railroad employees, 838 were on the gold roll.

ters, the collection and disposal of garbage and refuse, the issue of furniture, and the delivery of distilled water and commissary supplies to the houses of employees, and is to have charge of the construction of all new buildings. Operating in conjunction with the purchasing department in the States, the quartermaster's department secures all supplies needed for construction and other purposes and makes purchases of materials on the Isthmus when required.

The common-labor force of the commission and the Panama Railroad aggregates in the neighborhood of 25,000 men, and consists of about 6,000 Spaniards, with a few Italians, the remainder being from the West Indies. The Spaniard is the best laborer, as he possesses more strength and endurance. Under some conditions this is not true, the foreigner strenuously objecting to doing work that requires him to stand in water.

All the skilled labor, the clerical force, and the higher officials are Americans and are recruited through the Washington office.

This department also has charge of all the property records, receives semiannual returns of property from all those to whom property has been issued, and checks the returns and inventories of the storehouses, made at certain times, with the records compiled from original invoices.

THE HOTELS AND MESSES FOR THE MEN

The subsistence department has charge of the commissaries and the manufacturing plants, which consist of an ice and cold-storage establishment, a bread, pie, and cake bakery, a coffee-roasting outfit, and a laundry. These belong to the Panama Railroad Company, as, at the time they were established, money received from sales could be reapplied, whereas if operated by the commission the money would have reverted to the Treasury, necessitating reappropriation before the proceeds of sale could be utilized. They are, however, under the management of the subsistence officer of the commission, who has charge of the various hotels, kitchens, and messes of the commission.

There are 16 hotels from Cristobal to Panama, which serve meals to the American, or gold, employees at 30 cents per meal. There are 24 messes where meals to European laborers are served, the cost per day to such laborers being 40 cents; and there are 24 kitchens, or messes, for meals supplied to the silver laborers, or West Indians, the cost to the laborer being 30 cents per day for three meals. Subsistence is furnished without profit to the commission, though every effort is made to have the institutions self-supporting. The commissaries and manufacturing plants are operated at a profit, so as to reimburse the Panama Railroad Company for its outlay in six years from January 1, 1909, at 4 per cent interest.

The subsistence department also has charge of the Hotel Tivoli, which is a large hotel located at Ancon, for the entertainment of the commission's employees at a comparatively low rate, and of transient guests at rates usually charged at first-class hotels.

All moneys are handled by the disbursing officer, who pays accounts that have been previously passed upon by the examiner of accounts. This last-named official makes the administrative examination required by law prior to the final audit of the accounts by the Auditor for the War Department. The pay rolls are prepared from time books kept by foremen, timekeepers, or field clerks, subsequently checked by the examiner of accounts, who maintains a force of time inspectors. The time inspectors visit each gang, generally daily, at unknown times to the foreman, timekeeper, or field clerk, and check the time books with the gangs of workmen; the inspectors report to the examiner of accounts the results of their inspection not only in connection with timekeeping, but all violations of the regulations of the commission that may come under their observation.

Payments of pay-rolls are made in cash, beginning on the 12th of each month and consuming four days for the

entire force on the Isthmus. All American employees and European laborers are paid in gold; all on the so-called "silver roll" are paid in Panamanian silver.

THE ENGINEERING DEPARTMENT

The department of construction and engineering is under the direct charge of the Chief Engineer. He is assisted by the Assistant Chief Engineer, who considers and reports upon all engineering questions submitted for final action. The Assistant Chief Engineer has charge of the designs of the locks, dams, and spillways, and supervision of these particular parts of the work. There is attached to the Chief Engineer an assistant to the Chief Engineer, who looks after mechanical forces on the Isthmus and has supervision over the machine shops, the cost-keeping branch of the work, the apportionment of appropriations, and the preparation of the estimates. There is also an assistant engineer, who has charge of all general surveys, meteorological observations, and river hydraulics.

The zone is divided territorially into three divisions, each in charge of a division engineer, the first extending from deep water in the Caribbean south to include the Gatun locks and dams, known as the "Atlantic Division." The second, or "Central Division," extends from Gatun to Pedro Miguel, and includes the excavation through the continental divide. The third, or "Pacific Division," extends from Pedro Miguel, including the locks and dams of that locality, to deep water in the Pacific.

The general plans emanate from the office of the Chief Engineer and the details are left to division engineers, subject to the approval of the Chief Engineer. The whole idea of the organization in the department of construction and engineering, and in fact of all the work, is to place and fix responsibility, leaving to each subordinate the carrying out of the particular part of the work intrusted to his charge.

Each division engineer has charge not only of the work involved in the construction of the canal, but all municipal engineering, including water supply, building and maintaining roads, and the establishment and maintenance of sewer systems. With the force under his charge the division engineer executes such sanitary draining as may be prescribed by the chief sanitary officer, so that all construction work, excepting the construction of buildings, concerning the location of which the division engineer is consulted, however, is directly in the hands of the division engineer.

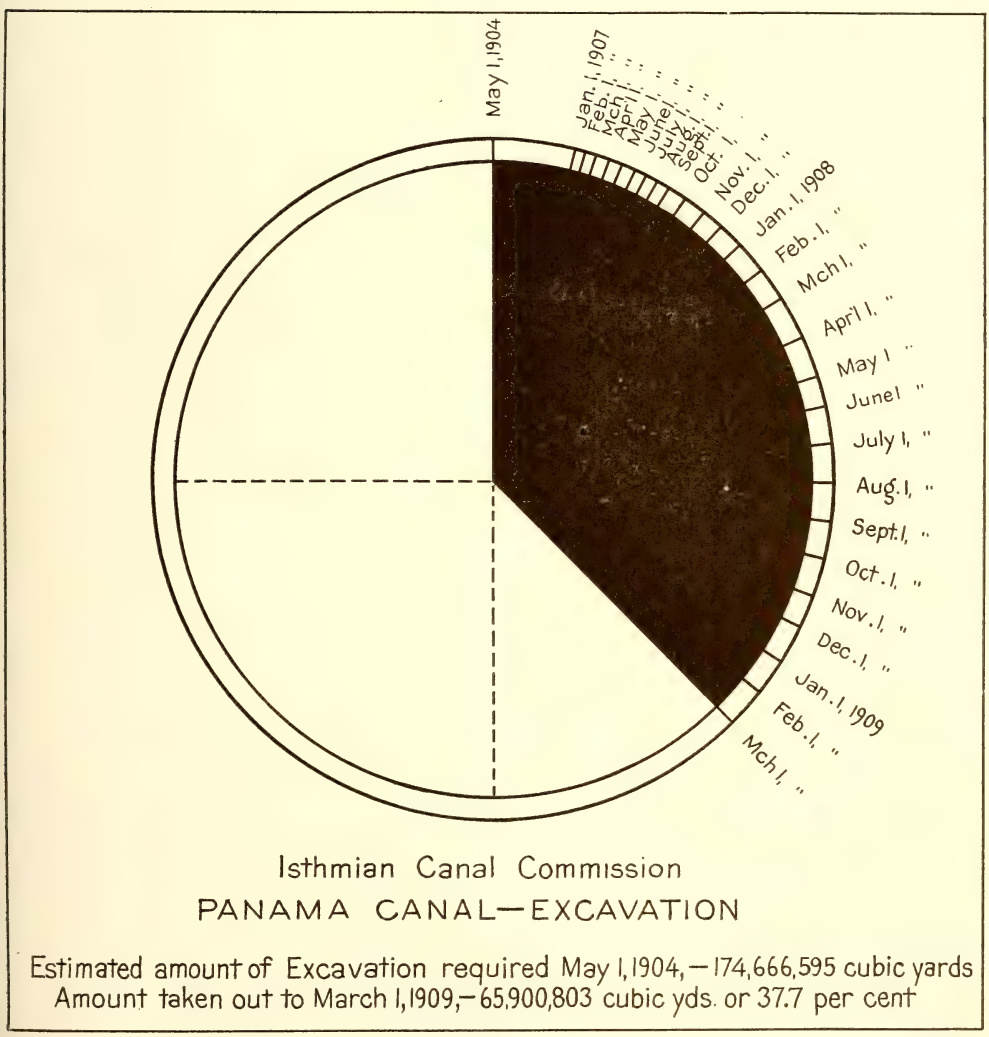
THE Y. M. C. A.

Attached to the office of the chairman is a general Y. M. C. A. secretary, who has supervision of the commission's club-houses, which are operated and maintained under the auspices of the Y. M. C. A. Four of these are now constructed and in operation, and four more are to be built from funds recently made available by Congress. They have done much toward securing a greater permanency to the force, in giving healthful amusement, and to a better contentment on the part of the employees.

I have endeavored to show that a channel of sufficient width, in which the waters of the many streams, especially the Chagres, will not be a menace, is one most desired for an Isthmian Canal. The sea-level canal proposed by the majority of the Board of Consulting Engineers is not of sufficient width, nor is the proposed solution for the impounding and diversion of the Chagres and other streams based upon sufficient investigations to insure its success. The "ideal" sea-level canal, the Straits of Panama, recently proposed, is not based upon any investigations of the work to be done and cannot, in view of the approximate estimate of the cost of our own sea-level canal, which is about one-third the size of the "ideal" plan, be given serious consideration. Every criticism against the stability of our locks or dams can be attributed to either an argument in favor of one's own plans or to absolute ignorance of the exhaustive data concerning their safety now in existence. The sev-

eral other plans of lock-type canal have nothing in their favor that the plan now adopted does not possess to a greater degree.

I have endeavored also to show that the organization on the Isthmus is compact and complete in every way, performing its duties of construction, sanitation, and government with clock-like precision. I cannot do better than quote from the message recently sent to the Congress, "that hereafter attack on this type—the lock type—is in reality merely attack upon the policy of building any canal at all," for the adoption of a sea-level canal anywhere approaching the ease of navigation of the lock type will result in the ultimate abandonment of the canal; and I assure you that several years hence, no later than January 1, 1915, even the most ardent sea-level advocates will, in making the voyage through the canal, admit that the ability to navigate a battleship at a high rate of speed through the lake and wide channel from Gatun to Pedro Miguel far outweighs the small inconveniences of the safe lockages up to and down from the summit level.



Isthmian Canal Commission

PANAMA CANAL—EXCAVATION

Estimated amount of Excavation required May 1, 1904, — 174,666,595 cubic yards
Amount taken out to March 1, 1909, — 65,900,803 cubic yds. or 37.7 per cent

THE ORIGINAL BOUNDARY STONES OF THE DISTRICT OF COLUMBIA

By Ernest A. Shuster, Jr., U. S. Geological Survey

TOURISTS when at the National Capital are usually anxious to visit the home of Washington at Mount Vernon, and to examine the many relics of the great man which are exhibited there. Few, however, if any, realize that in the woods and fields surrounding the great city stand thirty-six little witnesses to the energy and foresight of our national hero and the men he gathered around him when laying the foundations of our government.

These thirty-six are all that are now visible of the forty original boundary stones of the District of Columbia. In the years 1791 and 1792 a party in charge of Major Andrew Ellicott, and under the general direction of President Washington, were engaged in laying out the limits of the "Federal Territory" to surround the then embryo capital city.

Upon glancing at the map, the original District is seen to have been an area ten miles square, with the diagonals running north and south, east and west, the south corner resting on Jones' Point, on the Potomac River, just below Alexandria, Virginia. The post marking this corner was set, with Masonic ceremonies, in April, 1791. The lines were then run to the east and west corners, thence closing at the north corner, not far from Fenwick, Md. The timber was cleared along the line, and the stone monuments set at intervals of a mile, except where the mile fell on unfirm ground or in a stream. The monument was then marked with the odd distance.

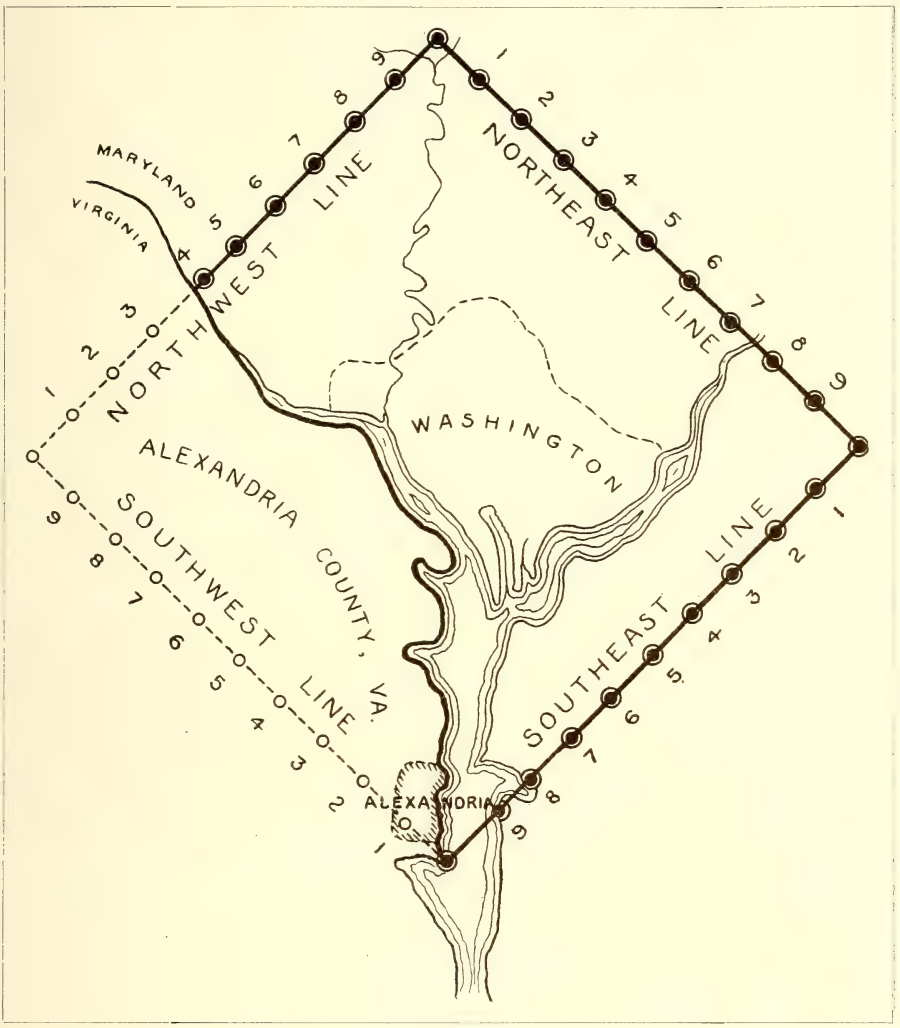
The material from which the posts were cut is the Acquia Creek (Virginia) sandstone, the posts being 12 inches square and 24 out of ground, the corner posts being 36 inches high, with the exception of the west corner, which is of the same size as the intermediate stones. Evidently a mistake was made, as there is a 36-inch stone at No. 3, on the southeast line. The stones appear to have been sawn from the rough, the saw marks being plainly visible on many. The words Jurisdiction of the United States, followed by the number of miles from the corner at which the series begins, appear on the side facing the District. Passing around the stone to the right, one is confronted with the figures 1791 or 1792, according as he is in Virginia or Maryland. The third side reads Maryland or Virginia, and on the fourth is given the magnetic variation at that time.

About twenty years ago the Coast and Geodetic Survey remeasured the District, and determined the exact position of the monuments, with the result that the four sides of the "square" were found to average 160 feet long in the ten miles, and the entire area is tipped westward on the south corner as a pivot, so that the north corner is 116 feet west of its proper position.

That part of the original District which lay west of the Potomac River was ceded back to Virginia in 1846, the area being now called Alexandria County. The line then ceased to have the importance of a State boundary, and for this reason, possibly, the monuments on this side of the river are not as easily found.

During the summer of 1908 I had the privilege of retracing the District line and visiting these old monuments in company with an interested relative and a camera with which to record their condition. It is, of course, impossible to reproduce all of the many photographs taken during the summer, but only those which show interesting features.

The south corner post lies buried behind the sea wall at the Jones' Point Lighthouse. The southeast, No. 7, is

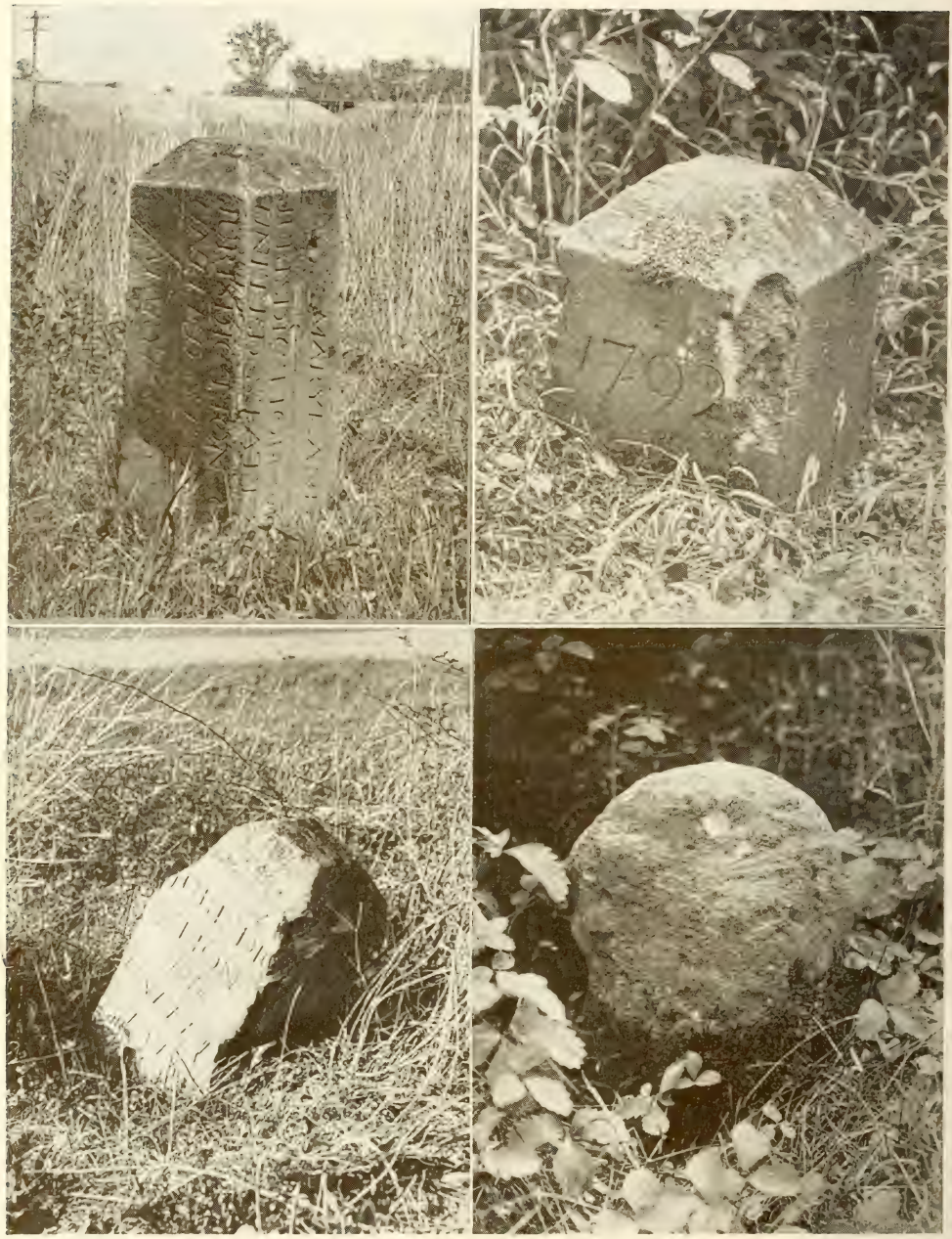


MAP SHOWING THE ORIGINAL BOUNDARY STONES OF THE DISTRICT OF COLUMBIA

also buried in the approach of a small modern bridge, and of the southwest, Nos. 4 and 5, only the stumps remain, the 4 being buried and the 5 lying on the ground. The southwest, No. 2, no one seems to remember. The stone has been missing for many years.

On the side of the present District we had the advantage of the excellent large scale maps resulting from the work of the Geodetic Survey, of which I have spoken, but even with this assistance a little stone 12 inches square can be passed time and again within a few feet in a dense thicket. There was an indescribable pleasure in finding the stones by means of the maps, and in only two or three cases did we ask assistance from the people living in the vicinity. Twenty-three Sunday afternoons were spent in the search from the latter part of March to the end of August, six stones being our largest afternoon's work. On two evenings, however, we returned home without adding to our score.

For those visitors to Washington and vicinity who have the time and the desire to examine one of the stones, the



THE EAST CORNER

Taken from the inside of the District, the line enters the stone at the vertical line on each face, and makes the angle at the center of the stone.

NORTHEAST, NO. 5

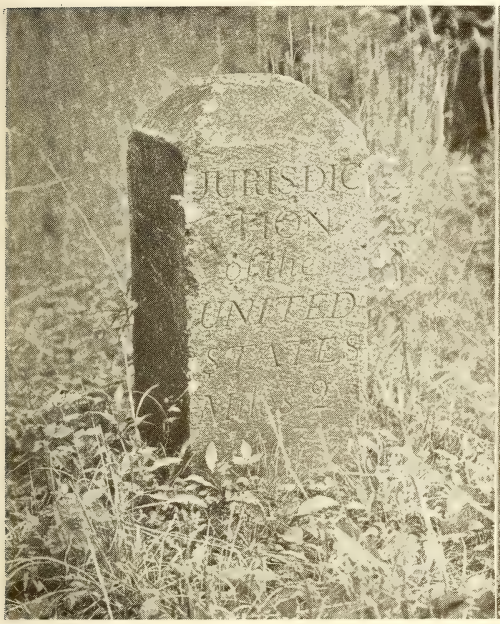
For thirty years this stone has leaned at a decided angle. The cause is unknown

SOUTHEAST, NO. 8

Deeply buried in marshy ground, showing date

SOUTHEAST, NO. 4

No vestige of any lettering remains upon this stone, which is at the side of a well-traveled road.



SOUTHEAST, NO. 2

A stone with comparatively clean inscription, showing saw marks

NORTHEAST, NO. 7

Although this stone is badly seamed through the center, it is otherwise in better condition than any other.

northwest, No. 7, is perhaps in better condition than any of those most easily accessible. It is situated about a quarter of a mile southwest of Chevy Chase Circle, which is reached by trolley. A modern marker stands on the southwest margin of the circle, and the old stone may be found by walking in the direction of the line cut in the top of the marker. As the monument stands in an open field, it is easily seen. The northeast, No. 2, stands in the town of Takoma Park, also reached by trolley, and is on Maple street, about 100 feet northeast of its junction with Carroll street, at the end of a hedge.

It is to be hoped that the authorities will awake to the fact that if these monuments are not protected in some manner from the elements and the hands of vandals they will soon be lost to us, as the material is of a particularly friable nature. In spite of their dingy and battered appearance, the little stones with their quaint lettering seem to reflect the simple dignity of the days and people we all wish to keep in loving remembrance.

EDITORIAL NOTE.—Mr George Mixter, 2nd, author of the interesting article on "Hunting the Great Brown Bear of Alaska," published on pages 313–333 of this number, desires us to state that the illustrations accompanying the article are from photographs by the three members of the party, Dr C. G. Mixter, Mr C. R. Cross, Jr., and George Mixter, 2nd, and were not taken exclusively by the author.

THE LEACH'S PETREL: HIS NURSERY ON LITTLE DUCK ISLAND

By Arnold Wood

With Photographs by the Author

LITTLE DUCK ISLAND, nine miles south of Northeast Harbor, Mount Desert Island, Maine, is the nesting place for three species of sea birds—the herring gull, the black guillemot, or sea pigeon, and the Leach's petrel, also called white-rumped or forked-tailed petrel. This island is about half a mile long and a third of a mile wide, partly covered with scrub pines, underbrush, and wild raspberry bushes. Although its shores are very rocky, the interior is fairly well covered with soil, which is, however, not deep, as rocky ridges are to be seen in all directions. Among the birds above mentioned, the herring gulls, whose rookery is well known and who nest there from May until August, are to be seen by the thousand.

I doubt if it is generally known that the petrel lives there at all, though, as a matter of fact, I think I am conservative in saying that ten petrels nest on the island to every gull. While this island is occasionally visited in the daytime for the purpose of seeing the gulls, one would never know from any outward sign that the petrel is in point of numbers the chief inhabitant.

I have visited Little Duck Island a number of times, and studied the burrows of the petrel, which are found there in large numbers. These burrows or

A PETREL BURROW ON THE GROUND: THE PETREL IN THE FOREGROUND IS ABOUT TO ENTER THE NEST

A PETREL BURROW IN A BANK

tunnels are found in the banks and on the ground or under rocks all over the island. The petrels are especially fond of making them among the raspberry bushes, probably because of the fact that the ground is softer there, and consequently easier to tunnel. The tunnels are from 18 to 24 inches in length, with at least one turn, and descend at an angle of about 30 degrees. At the end the tunnel is slightly enlarged or scooped out, and a few straws and blades of grass gathered in a little heap constitute the nest on which the bird lays its one egg. This egg is about one and a quarter inches in length, white, with small faint reddish-brown spots on the large end, and is very fragile.

One of the birds is always on the nest during the day, while its mate is far out at sea. I say far out, as the petrel is very rarely seen near the coast. Some ornithologists have stated that the male bird usually sits on the nest during the day. While I am not in a position actually to disprove this, I doubt if it is the rule, my belief being founded upon recent observations, when spending the night among the petrels watching their nocturnal habits as they return from sea.

Their burrows or tunnels will just admit the hand and arm, and if one has a fairly long reach one can withdraw the sitting bird from the nest. They are comparatively tame, although, as a means of defense against any intruder in their nest, they will emit from the mouth about a teaspoonful of a reddish-brown fluid, which is most pungent and of a strong musky odor.

When brought into the light the birds seem to be somewhat blinded by the brightness, and for a few moments will pose most considerately; but they shortly become used to the change, and will work their way clear of the long grass and other obstructions until their wings are free, when they take to flight. On the

PETREL LEAVING NEST

NEST AND EGG

THREE ADULT PETREL IN HAND

ground they are most awkward, their very long wings, together with their webbed feet, interfering with their progress.

The night that I spent on the island gave me a better opportunity of watching the habits of this bird than I could have obtained in any other way. About dusk I walked to a certain spot where I knew there was a large number of their burrows, and sat down on a rock to await their return from sea. There were burrows within four feet of where I sat, and I speculated with much interest as to what effect my close proximity would have on the occupants when their mates returned.

About this time hundreds of gulls were returning to the island for the night, and before me, sitting on the rocks and flying in the air, were thousands of them, making the twilight hideous with their continual screeching and crying. As soon as night settled down, they in turn found roosting places on the rocks near the shore, and their cries became more and more faint, until at last the occasional note of but one or two could be heard, showing that nearly all the birds were asleep; then one faint cry and all was still, and a death-like silence fell upon the island.

Hardly had I time to appreciate the relief from the hours made hideous by the noise of the gulls, when from far out over the water there floated in a strange note, which I knew at once must be that of the petrel. Louder and louder this note grew, until at last two birds flew over my head, sailed around me, all the time uttering their sharp, wild, and guttural call. These two birds suddenly disappeared in the darkness, shortly to return with hundreds and hundreds of their kind, until the whole night seemed alive with them, flying with bat-like mo-

SHOWING THE GREAT EXPANSE OF PETREL'S WINGS

tions, each one crying out in the same notes and key.

They swooped down on me and around me, in one instance brushing my hat with their wings. They all seemed to be laboring under the greatest excitement, so great was the confusion. The whole island had come to life again; wherever one looked, wherever one went, the place swarmed with petrel; and they had it to themselves, for all the gulls leave the fields at night and roost on the rocks near the sea. After some fifteen minutes another note was heard, and on following the direction from where it came, I was led to one of the burrows, at the entrance of which stood the bird that had been on its nest all day, calling to its mate among the hundreds flying around in a most plaintive, sad little note.

They seem to have absolutely no fear of man—in fact, to ignore his presence—and will meet their mates almost at one's feet. After watching them for some time I returned to my tent, which I had erected on a wooded knoll, where I had not seen any of their burrows On arriving there, however, I was greatly surprised to find as many petrels as I had left behind, and it seemed as though they came out of the ground in every direction like so many ants.

Sleep was impossible, so great was the noise they made; but it was a different note from the one they uttered when arriving—a constant twitter, ending in a deep chirp, never ceasing for a moment. During all this time the birds were flying about, truly the busiest, most active little fellows I have ever seen. Just before dawn they suddenly stopped, and, on looking out of my tent, I found they were gone, every one of them, quicker even than they had come, six hours before. Hardly had I returned to the tent when the gulls awoke, and reigned supreme for another day. One might almost be led to believe that the petrel time their arrival and departure by the hours during which the gulls are silent.

I am inclined to believe that the female bird usually sits on the nest, and that her mate is the bird that is hunting far at sea, returning at night to feed her, busy

in that occupation until dawn, when he is off again.

They have three very distinct calls; one might be named "heralding their arrival"; another, when calling their mates to their respective homes, "the song of greeting," and a third, when they are flying about their nests, "the feeding notes."

After their departure in the morning the atmosphere is impregnated for a few hours with the odor of musk. They must emit this liquid while flying about their nests, for the bird has no odor beyond a slightly oily scent. Perhaps it is an instinctive habit, to make the surroundings objectionable to any of their possible enemies during the nesting season.

The young are hatched during the latter part of July, and by September 15 they are gone, not to return until the following year. The young are completely covered with the finest kind of mouse-colored down, and in the hand resemble a ladies' powder puff, both in size and texture. The parent birds as a rule leave the nest during the day after the young are hatched, returning at night for the purpose of feeding them. The young birds do not leave the nest until they attain nearly their full growth and plumage.

While the shores of the Bay of Fundy are the principal nesting-places for this bird, Little Duck Island certainly does its share as a nursery for the Leach's petrel. Thousands and thousands of these birds return to rear their young where they themselves were hatched. One marvels at the instinct which guides them on a foggy night, from several hundred miles out at sea, to a small spot on the ocean scarcely half a square mile in size, and on a course straighter than any ship could be steered. Upon arrival, each flies straight to his own burrow, although there are a hundred next to his, and to the human eye all look alike. Perhaps it is this same instinct which brings back the young another year to build their nests, as their ancestors have done, on the cliffs and fields of Little Duck Island.

EGG OF LEACH'S PETREL: NATURAL SIZE

COLOSSAL WORK IN BALTIMORE

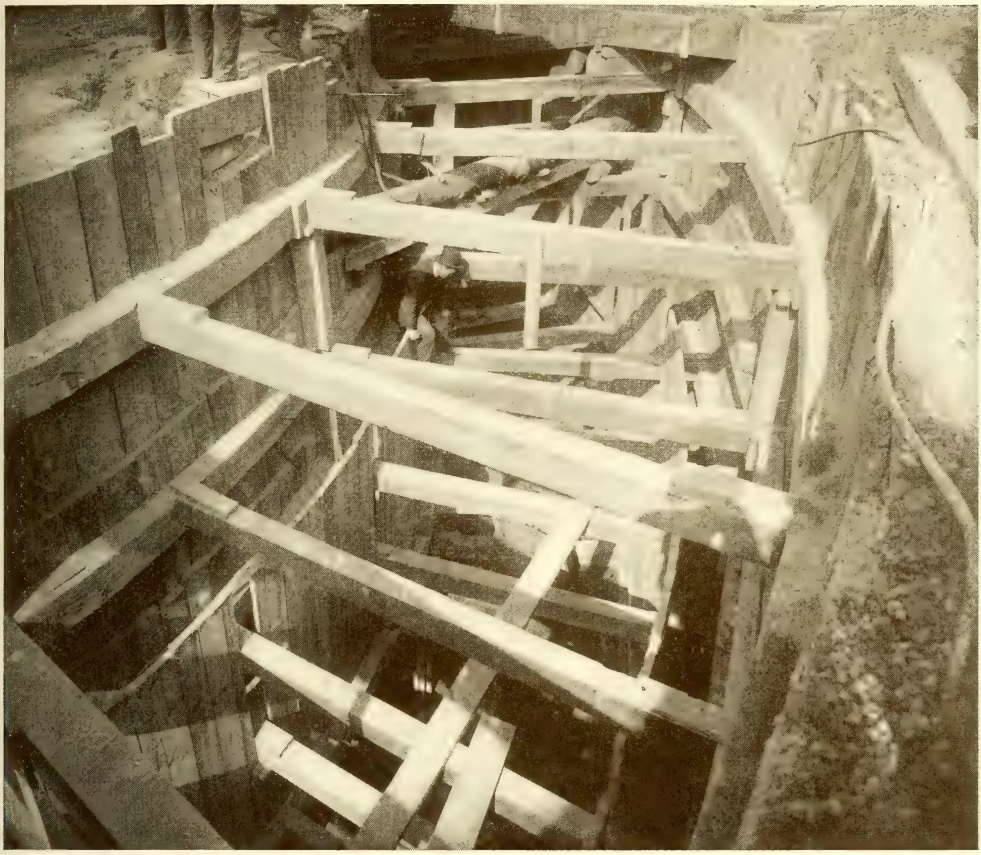
By Calvin W. Hendrick

Chief Engineer, Sewerage Commission of the City of Baltimore

BALTIMORE, one of the oldest and most aristocratic cities of this country, has allowed itself to grow to a size of 700,000 people without a sewer system, depending on the old methods of disposing of the sewage by means of cesspools and otherwise.

In order to protect the oyster trade, one of her great industries, amounting to some fifty millions of dollars a year, the State of Maryland has recently passed laws forbidding the discharge of sewage into the Chesapeake Bay or its tributaries without first purifying it. This has brought the city face to face with one of the most stupendous engineering projects of modern time—*i. e.*, the installation of a storm-water and a

VIEW IN ONE OF THE GREAT SIPHONS OF THE BALTIMORE SEWERAGE SYSTEM (SEE PAGE 367)



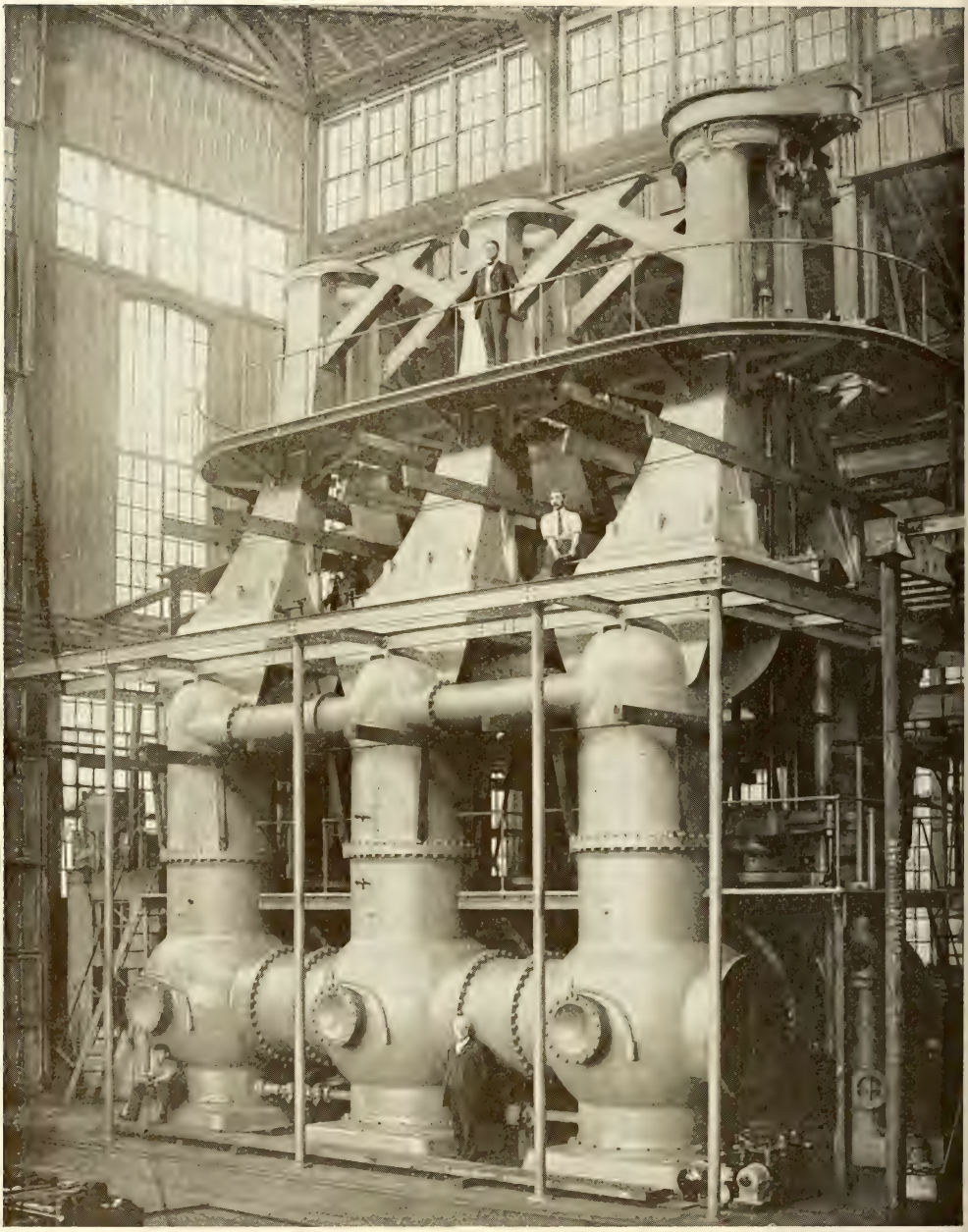
SHEATHING OF A DEEP TRENCH

sanitary sewerage system throughout the streets and alleys of the entire city, carrying connections to each individual house. This public work is being handled on a very broad scale, and is being pushed to completion in a most rapid and business-like manner.

The city expects to spend about $20,000,000 in disposing of the storm-water drainage and carrying the sewage to great disposal plants, in which the sewage will be brought to a state of purification equal to drinking water before discharging it into the Chesapeake Bay. In carrying out this great project, some of the sewers are of such size as to remind you of the ones in Paris.

In order not to have to purify the storm-water that falls, two systems, one for storm-water and one for sanitary sewage, are being constructed, amounting in all to about 1,100 miles in length. This is some cases causes two large sewers of the different systems to come together on the same level, necessitating the siphoning of one beneath the other. The photograph on page 366 shows one of the largest siphons in the world, constructed along such unique lines as to have caused wide comment in the engineering world.

The great trouble with siphons is brought about by having to make the siphon large enough to take care of a heavy cloud-burst and still be operative during the summer flow, when there is a mere trickle, causing deposits to accumulate in the siphon. In this case a battery



ONE OF THE FIVE 27,500,000-GALLON PUMPING ENGINES TO BE INSTALLED IN THE SEWAGE PUMPING STATION

Elevation of engine No. 1 without steam cylinders; height of top cylinders, 48½ feet; weight of each engine, 1,400,000 pounds

A COMPLETED SECTION OF THE OUTFALL SEWER

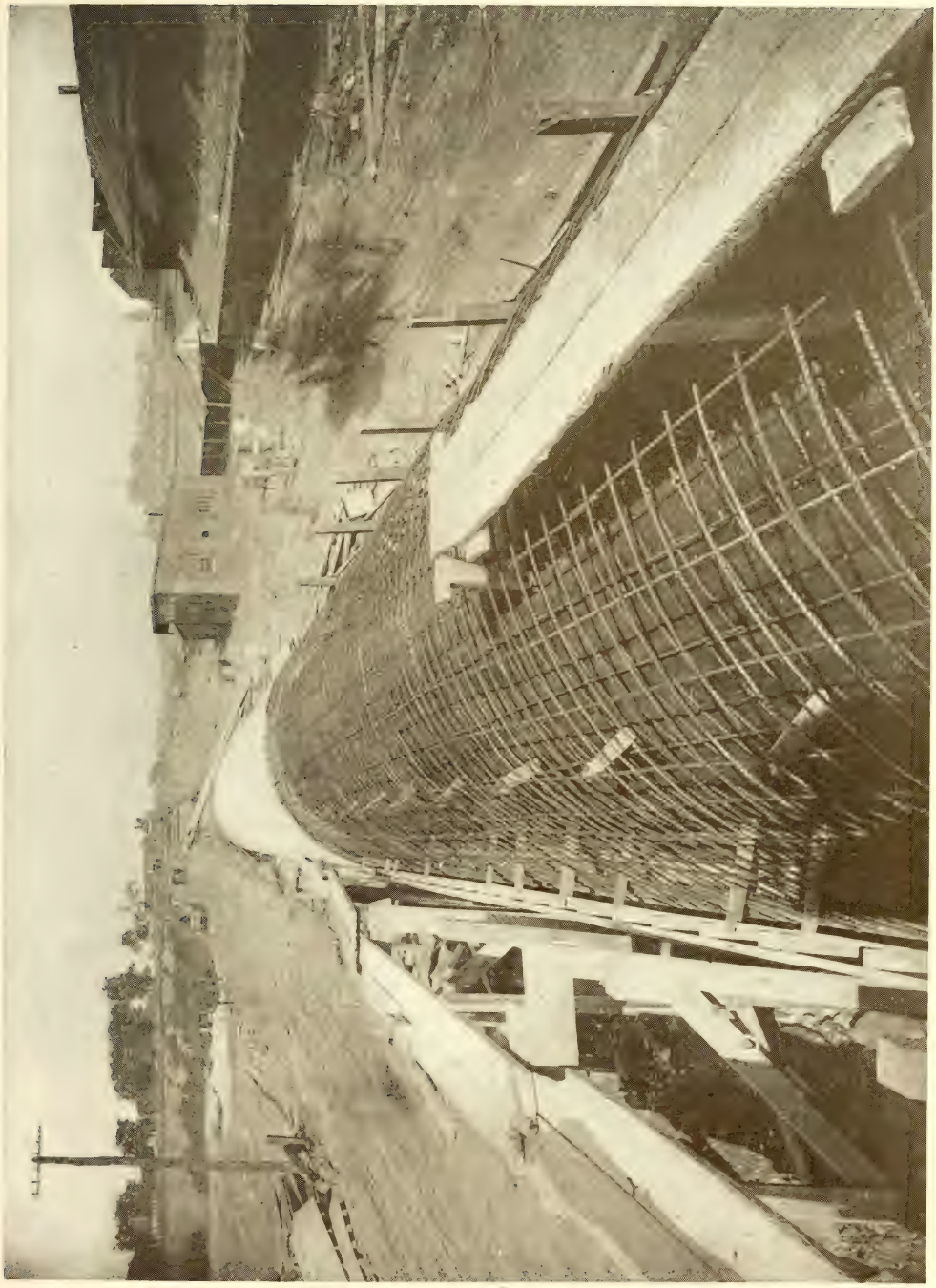
of pipes is used in connection with dams, the small pipe being for the summer flows, which keep it under pressure. Should a rain cause the flow to increase, it rises over a dam, discharging into a larger pipe, with still another pipe in reserve, with a higher dam to take care of a cloud-burst, thereby putting all the pipes under pressure, scouring them out by the water in the reserve order, until the flow is back in the small pipe, which pipe is under constant pressure by the dry-weather flow.

Concrete is being used to a great extent, and wonders are being moulded under the city with this concrete construction.

The storm-water flows directly into the harbor or to Jones' Falls, a stream passing through the city.

Two-thirds of the sanitary sewage of the city is intercepted by what is called the high-level intercepter, and is carried by gravity to the disposal works located on Back River. These works, when completed, will be capable of treating 300,000,000 gallons a day. The sewage from the other third of the city, lying around the harbor and below the high-level intercepter, is carried to a pumping station by an east and a west low-level intercepter. There the sewage is lifted from about 13 feet below tide, a height of 72 feet, including friction, by huge pumps, each capable of lifting 27,500,000 gallons a day. The photograph on page 368 shows one of the five pumps to be installed, now under construction. These pumps lift the sewage through iron force-mains to the high-level intercepter, whence it flows by gravity to the disposal plant.

THE GOVERNOR OF MARYLAND, THE SEWERAGE COMMISSION, AND PARTY OF FINANCIERS ACCOMPANYING CHIEF ENGINEER HENDRICK ON A TOUR OF INSPECTION (VIEW TAKEN IN OUTFALL SEWER)



ANOTHER VIEW OF THE OUTFALL SEWER, SHOWING THE METHOD OF REINFORCING

The method of treating the sewage at the disposal plant consists of hydrolitic tanks, sludge-digesting tanks under still water, stone sprinkling filters at a lower level, consisting of beds of broken stone 8½ feet deep, over which the sewage is distributed by means of sprays, then by under drains is carried to settling basins at a still lower level, and thence into Back River, coming out practically pure water.

Between the settling basins and the river into which the effluent is discharged there is a fall, which is utilized to generate electricity used to run pumps and other machinery for various uses throughout the plant.

Baltimore, in one respect, reminds one of Rome, the City of Hills, and in another respect it reminds one of Pompeii as she lay looking out over her beautiful bay under a mild climate, the people coming and going. When the attention of the citizens of Pompeii was called to the dangers of smoking Vesuvius near by, the answer would be: "It has never given us any trouble, so why should we worry?"

Just as the attention of the people of Baltimore has been called to the lack of sanitation, the reply has been: "It has never given us any trouble; why should we worry?" The Pompeiians were not as smart as the Baltimoreans—they did not awaken to a realization of their danger until too late, while the Baltimoreans have risen to the occasion by preparing before an epidemic should compel them to do so. The people of Baltimore have been sleeping and working over a volcano which, if once started, would make the city stand out before the world in a manner similar to that of 1904; but in the place of fire it would be epidemic.

Beneath the surface there is an underground air which investigation has proved is almost as ceaseless in motion as that in which we move. Whenever the ground becomes heated it streams out through the myriad pores of the earth's surface into the sunshine; when the ground cools, back through these pores rushes the aërial air. Every wind that sweeps the surface moves the air beneath in great volumes. With every rain it is driven deeper down. The movement of this buried atmosphere is slow, because it must find its way around myriads of soil particles which block its path, but it is of great extent and importance.

It is reasonable to suppose that with thousands of septic tanks filtering into the subsoil of a city for years and years this under-ground air would, in the course of time, grow foul. Each year this would grow worse and worse, until there would be a breaking point.

The men who were far-sighted enough to rouse the people of Baltimore from their slumbers and begin this great work before it was started in another way deserve a monument to their memory. I do not know of a single instance in history where a city the size of Baltimore has at one single stroke attempted to sewer the entire city, treating its enormous sewage by the most modern methods, both as to disposal of its storm water and purifying its sewage almost to drinking water.

In the sewerage system being constructed in Baltimore every known latest improvement is being used, besides numerous improvements which have been designed by the engineers of the commission.

One of the greatest difficulties encountered has been the vast number of under-ground obstructions beneath the streets of the city.

In a recent address made to the Society of Civil Engineers in Washington, D. C., I stated that the sewage problem as a world factor is forcing itself to the front very rapidly, and our country is approaching a point where it will have to deal with the sewage question on a broad scale. As rivers run from one state to another, the states cannot deal with the problem without clashing, and it will soon have to create a National Sewage Board similar to those abroad.

We have heretofore, on account of the vastness of our country and the size of our rivers, simply disposed of the sewage in the most economical manner at the

time, regardless of results, such as dumping it directly into lakes and rivers. This has been a short-sighted policy from the fact that large expenditures have been entered into in the way of sewers, which will necessarily have to be readjusted in order to conform to sanitary laws now being passed requiring the treatment of sewage before discharging it into rivers or lakes.

The city of Baltimore is showing the same progressive spirit in handling this great sanitary problem that she has shown in many other enterprises of world-wide interest, causing cities all over the world to send committees and engineers to study the plans and methods of prosecuting the work, which in magnitude, character, and rapidity of execution stands unequaled.

THE WORLD'S MOST CRUEL EARTHQUAKE

By Charles W. Wright

Of the United States Geological Survey

Mr Wright was sent to the region of the recent Sicilian earthquake by the National Geographic Society to make such study and investigations as a week's stay at Messina and Reggio would permit.

An earthquake such as the recent one at Messina is a catastrophe of the first magnitude. It will be recorded in history as one of the world's greatest disasters, though viewed geologically it represents a sudden displacement of probably only a few inches in the earth's crust and is of less importance than other earthquakes during the last decade.

As a geologist I have always had a desire to witness the results of an earthquake, if not at the time of occurrence, then directly afterward, so as to see not only the geologic changes, but the vast destruction to the surrounding country, as well as its effect on the inhabitants. So the opportunity to visit Messina through the courtesy of the Board of Managers of the National Geographic Society was gladly accepted.

I reached Sicily the middle of February and spent a week there. No accommodations being available in Messina, it was necessary to go to Taormina, just an hour's ride by train, and a remarkable contrast it was to leave the dust and desolation of the fallen city at sundown for the most glorious garden spot in all Italy.

Before discussing the disaster, however, let us first glance through our Baedeker to learn something of the cities and their population; also of the industries and commerce of this part of the Mediterranean.

Those who have been fortunate enough to visit the north of Sicily will remember the indescribable charm and fascination of that entire section. Towering peaks rise from each side of the straits of Messina to elevations of 4,000 to 6,000 feet, and dissecting their gradual sloping sides are canyon-like valleys which broaden into wide flats at tide water. On these gravel flats, or benches, above sea-level the cities of Messina and Reggio are situated, and higher up the valleys many villages are scattered. In these valleys and on the flanks of the hills orchards of lemons, oranges, and pomegranates are cultivated; also almond trees and vineyards, which, when in blossom, refresh the whole land with their fragrance.

MESSINA IS THE BEST HARBOR OF ITALY

Messina, now known to the whole world, is a large seaport town in the northeast corner of Sicily. The approach by steamer is of remarkable beauty, the

GENERAL VIEW OF MESSINA BEFORE THE EARTHQUAKE

Showing the sickle-shaped harbor, "the largest and safest in the kingdom of Italy," the straits of Messina, and the coast of Calabria in the distance

city rising amphitheater-like from the sea with a dazzling whiteness of houses along the water front, which present a picturesque contrast to the dark, rocky hills capped with castle ruins and forts in the background. The harbor, which is shown in the general view of Messina, is the largest and safest in the kingdom of Italy. It is over 30 fathoms deep, spacious, well furnished with quays, and defended by a fort and citadel. As many as 5,000 vessels call here annually, bringing wheat, cotton, wool, hardware, etc., and taking away cargoes of lemons, oranges, almonds, silks, wine, essence, oil, etc.

SKETCH OF MESSINA

Showing principal buildings, the city wall, and sickle-shaped harbor

In the city itself, which contained about 150,000 inhabitants, were several wide, handsome streets, including Corso Garabaldi, Cavour, and Vittorio Emmanuele, all of which are paved with granite blocks and ornamented with statues and fountains. Interspersed between the houses or occupying prominent corners were over fifty churches—the most ancient being the Duomo—a Palazzo Reale and Palazzo Municipali; also a large hospital (Ospedale Civico), a custom-house, (Dogana), and a theater in which Aida was sung the night before the catastrophe. It was a live city, the harbor and pier being usually full of boats and people, and every hour brought a trainload of freight to be ferried across the straits or loaded direct for shipment to foreign ports.

Its historical record of over 2,000 years includes bombardments during the Punic and Roman civil wars; also by the Goths and Saracens; a loss of 40,000 inhabitants by plague in 1740; an almost complete destruction by earthquake in 1783, with a death roll of 29,515 and property loss of $26,000,000; another bombardment in 1848 and another loss of 16,000 by cholera in 1854. In a memoir by Deodat de Dolomien, published in 1784, this earthquake is described as follows:

"The destructive shock of February 5, 1783, was sudden, instantaneous; nothing preceded it, nothing announced it; it broke forth and destroyed at the same moment; it did not give time for flight; . . . a larger part of the misfortune of Messina can be attributed to the lack of solidity in the structure of the buildings."

Both of these and many more of Dolomien's statements are equally descriptive of the recent disaster. Subsequent violent earth tremblings occurred in 1894 and 1896, the last important one being on September 8, 1905, and causing a death roll of 529.

On the opposite side of the straits is Reggio, a seaport of Calabria, 10 miles southeast of Messina. It, too, was a flourishing, opulent city of 45,000 inhabitants, with spacious streets and beautiful buildings and a history similar to that of Messina. Scilla, Faro, San Giovanni, Catona, Pellaro, Terresa, and Scallita are other towns which border this luxuriant shore-line and which also suffered destruction.

CORSO VITTORIO EMMANUELE LOOKING NORTH ALONG WATER FRONT IN MESSINA
Showing the local displacement of the quay, even below water level, and the destruction of the famous Palazzata, "the pride of Messina"

VIA PELLICANO LOOKING SOUTH ALONG WATER FRONT IN REGGIO
Showing destruction to buildings and temporary quarters of inhabitants. In the foreground lies a grand piano among the ruins

THE CATASTROPHE CAME WHEN EVERYONE WAS ASLEEP

The earthquake occurred on Monday morning, the 28th of December, at 5.23, while it was still dark and most of the inhabitants of the unfortunate towns were still sleeping. It came without warning; the shock was intense and widespread; it lasted 35 seconds, and during this small space of time most of the stupendous destruction of life and property took place. For several weeks preceding it slight shocks were felt in the vicinity of Messina, and subsequent shocks of considerable magnitude occurred on January 2, at 9.40 p. m., and January 5, at 12.10 p. m. The intensity was greatest at the north entrance to the straits, and its amplitude became rapidly less with increasing distance from this central point.

The vastness of the catastrophe in loss of life has hardly a parallel in the history of earthquake tragedies, and it is difficult indeed to conceive such an overwhelming disaster in so short a time.

The submarine cable was broken and all telegraphic communication was cut off, so that the first news of the disaster was dispatched at the time by one of the torpedo boats lying in the harbor. It immediately got up steam and raced up the Calabria coast to find a telegraph station intact, where the tale might be told and the call for aid given. All this took time, and it was night before Rome learned of what had happened in the southern portion of her peninsula.

The terrible news then traveled to all parts of the world, but they were only first reports and believed by most readers to be much overestimated. Headlines then appeared in the newspapers giving impossible accounts of the disaster; the whole coast line was reported to have been altered and adjacent towns swept away; it was said that deep chasms appeared in the city streets; that entire areas were overturned; roads and railways twisted and bridges uprooted. A grand eruption of Etna and the disappearance of the Æolian Islands were also vividly pictured and the subsequent tidal wave and destruction by fire exaggerated.

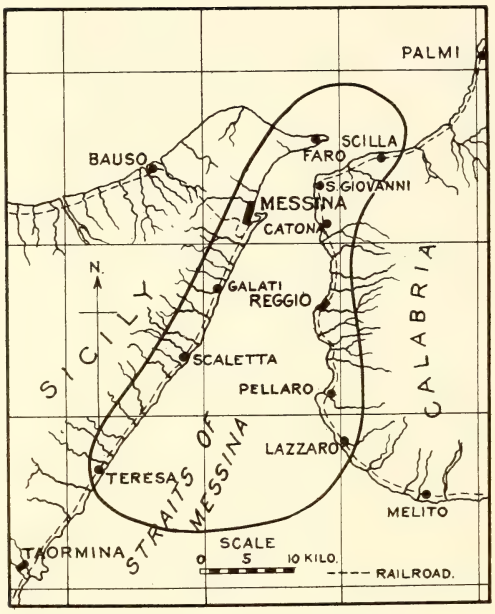
But in view of these mythical statements, that of the great destruction of people, the most heartrending of all, was, alas, not falsely reported. Though it is not possible even now to state accurately the loss of life, it is probable that the death roll of Messina alone will reach 100,000, that of Reggio 20,000, and of San Giovanni and other villages 30,000.

One survivor told me that he was suddenly awakened by a loud rumbling, with the sensation of being lifted up and swayed back and forth in the air, only to be let down again by jerks and jars. Another, who was on the street at the time of the earthquake, said that he first heard a low, whistling sound in the distance, which gradually grew louder and louder, and finally broke forth into a roar. The earth seemed to move in all directions at once, and it was impossible to stand.

Soon after this bewildering blow, which was accompanied by thunder-like rumblings of the earth and the crushing noise of falling towers and buildings, a dead silence spread over the city, only to be broken later by the shrieks of the wounded. It was pitch dark, and even the corner street lights were extinguished because of a breaking of the gas pipes. It was raining and a southeast wind was blowing. The uninjured rushed to the streets, but knew not which way to turn, and stood about helpless and often without clothes.

THE TIDAL WAVE WAS NOT PARTICULARLY DESTRUCTIVE

Directly after the shock the sea receded a short distance from the shore, but soon advanced again in the form of a foaming tidal wave 8 feet high at Messina and 12 to 15 feet high at Reggio. At Messina it washed over the neck of land forming the harbor, destroying the breakwater, leaving small boats stranded high above the shore-line and dashing a Russian steamer of 2,000 tons from its berth in the dry dock back into the bay,



SKETCH MAP SHOWING AREA OF MAXIMUM DESTRUCTION

where it sank. It flowed over the city quay, washing away small cargoes of freight and many crates of lemons, and even extended into the buildings along the water front. A few people who happened to be along the quay at this early hour were hurt, and it is possible that some were carried away by the water.

At Reggio still greater damage was done by the waves. Freight cars standing ready to be ferried across the straits were overturned and the wharf wrecked even more seriously than at Messina. Leaving this immediate area, the wave traveled southward to Taormina, Catania, and Syracuse, even reaching Malta, where it arrived 115 minutes after the earthquake.

Fire also broke out in several places about Messina, being caused principally by the breaking of the gas pipes, but there was little to burn, so that this terrible agent of destruction, so evident in the San Francisco earthquake, had a remarkably poor field to gain headway. The Palazzo Municipale, the Hotel Trinacria and other buildings scattered about the city caught fire and smouldered for a while, but were soon extinguished by the rain, which drizzled for the first few days after the destruction.

THE AREA OF DEVASTATION

The area of maximum destruction, as indicated on the accompanying map, extends from Terresa to Faro, on the Sicilian side, and from Lazzaro to Scilla, on the Calabrian side of the straits. In all, about 20 towns and villages were wrecked to a greater or less extent. Within this area, however, the damage was not uniform, as many villages up the valleys, and even some along the coast, were only slightly affected.

In the cities of Messina and Reggio rows of houses are standing which at first sight appear to have been saved, but behind these façades they are a total wreck. Probably the best example of this is the beautiful Palazzato, which was the pride of Messina. On the other hand, some buildings are only deprived of their front walls, leaving exposed to view the interiors of the rooms with overturned chairs and wall pictures slightly out of adjustment. Libraries, manuscript, letters, all kinds of furniture, including grand pianos and oil paintings, lie scattered throughout a debris of rubble and plaster, and buried beneath it all lie the bodies of those who gloried in these possessions.

The shock, of course, was felt at Taormina, Catania, Palermo, Syracuse, and other towns within a hundred-mile radius, awakening and frightening the inhabitants, but the buildings themselves were not damaged. Nevertheless, the effect of the earthquake on the beautiful cities of Sicily, dependent as they are on the tourist trade, has been great, for it has deprived them of one of their means of livelihood. The world of travelers has been frightened away from this glorious island at this critical moment when it needs them most. The hotels are empty and the guide or cabman cannot earn his lira nor the flower girl her soldo.

WORK OF RELIEF AND AID TO SURVIVORS

The torpedo boats and the battleship *Piemonte* of the Italian fleet were in the

VIA GARIBALDI, A PROMINENT STREET IN MESSINA, LOOKING NORTH

On the left is the Bank of Sicily, in which 75,000,000 francs were said to have been on deposit. An attempt was made to rob the bank just after the earthquake and one window shows where its bars had been forced open, but the safe with its treasures could not be broken into by the thieves. The money was recovered by soldiers later.

SCENE ALONG VIA PRIMO SEPTEMBER, MESSINA, SHOWING SOLDIERS IN CHARGE OF EXCAVATIONS

All valuables found are noted and placed in boxes, which are labeled by street and house number so as to be delivered later to the proper claimant

PIAZZO SAN LEO LOOKING WEST AND SHOWING TOTAL DESTRUCTION OF MANY BUILDINGS: MESSINA

"Thus they collapsed amid suffocating clouds of dust into a hideous conglomeration of rubble, mortar, and furniture, forming regular dead-falls for man"

SCENE IN REGGIO SHOWING SURVIVORS AND TEMPORARY QUARTERS
Their homes are in the background

INTERIOR VIEW OF THE DUOMO AT MESSINA SHOWING TOTAL COLLAPSE

Everything in the church was buried deep under timber and tile, even the large bronze bell, though the altar and sanctuary remain intact

THE HOSPITAL IN WHICH 200 PATIENTS PERISHED

INTERIOR OF DUOMO AT MESSINA SHOWING ROW OF SAINTS, SOME HAVING BEEN THROWN OUT OF THEIR BERTHS BY THE SHOCK

Beautiful columns of granite and porphyry lie in the foreground

INTERIOR OF SAN PAULO CATHEDRAL, SHOWING SOME MASTER PAINTINGS WHICH WERE SAVED

Many art treasures, of which Messina had its share, were destroyed. Of the 50 churches in Messina, only one remains standing

BOX COFFINS, EACH CONTAINING THREE BODIES, READY FOR BURIAL IN CEMETERIE INGLESIE

Under the mound on the right 7,000 bodies are said to be buried

harbor at the time of the earthquake, and their crews, with the few panic-stricken soldiers of the city, were the first to lend assistance to Messina. The next morning at daybreak the *Theropia,* a North German Lloyd boat, sailed into the harbor and soon after it came the Russian warship *Admiral Makaroff.* The crews of both ships turned immediately to the task of rescue, and that afternoon the *Theropia,* laden with wounded and refugees, weighed anchor for Naples. On the 30th the English man-of-war *Sutliedge* and others were dispatched from the fleet at Malta to join the rescuing parties, and Italian warships were sent from Naples and Sardinia. The sailors were organized in small gangs with an officer in charge and worked quickly and heroically, some losing their lives in the endeavor to save others.

Help did not arrive at Reggio until two days after the disaster, its fate being unknown even in Messina, as both telegraphic and railway communications were destroyed.

Twenty-four hours after hearing of the calamity the King and Queen of Italy departed for this scene of disaster, and their presence alone gave courage and hope to the distracted, while their personal assistance in relief work inspired others to do their utmost to succor the wounded and starving. Troops were also sent in from Catania, Palermo, and from the mainland as far north as Genoa, but without sufficient food supply for themselves, and many suffered because of it, though all showed courage and endurance. Hardly a building was left in Messina fit for shelter, and the rain and winds added much to the severity of the suffering. As every minute meant a life, all else save rescue was neglected, even to the burying of the dead, and both sailor and soldier worked far

into the night, often without food or shelter. The wounded were removed from the city as fast as possible by boats to Naples and by train to Palermo and Catania, where they were cared for in the hospitals, hotels, and private houses.

Systematic relief work was not inaugurated until a week after the misfortune, when the city was divided into three sections, each in charge of a detachment of soldiers, who camped in the public parks. Food and clothing were distributed to the survivors belonging to each section, but the main work of the soldiers was to assist in digging out those still under the ruins alive, and, worst of all, to guard the places and people against thieves. The earthquake opened the prison doors, and many of Italy's greatest criminals were liberated. They immediately set to work robbing the dead and the dying, so as to leave the city with full pockets. This shameless looting was soon put to an end when the soldiers were in full charge, the offenders being shot on the spot. Dozens of such thieves are said to have been killled.

In regard to the survivors, it is said that they behaved like children, running about the streets, aimlessly seeking food, and too stupid to leave the town for the country, where they could have found both food and shelter. One of the striking features which I could not help noticing was the apathy of the sufferers, their dazed expression and amazing resignation. Many doubtless are bearing their sorrows bravely, but some seem to be mentally benumbed.

Little of the actual suffering will ever be known, and lucky were those who were instantly killed. As some were brought alive out of the ruins after two weeks, there were many probably who withstood torture and starvation for at least a week before they were relieved by death.

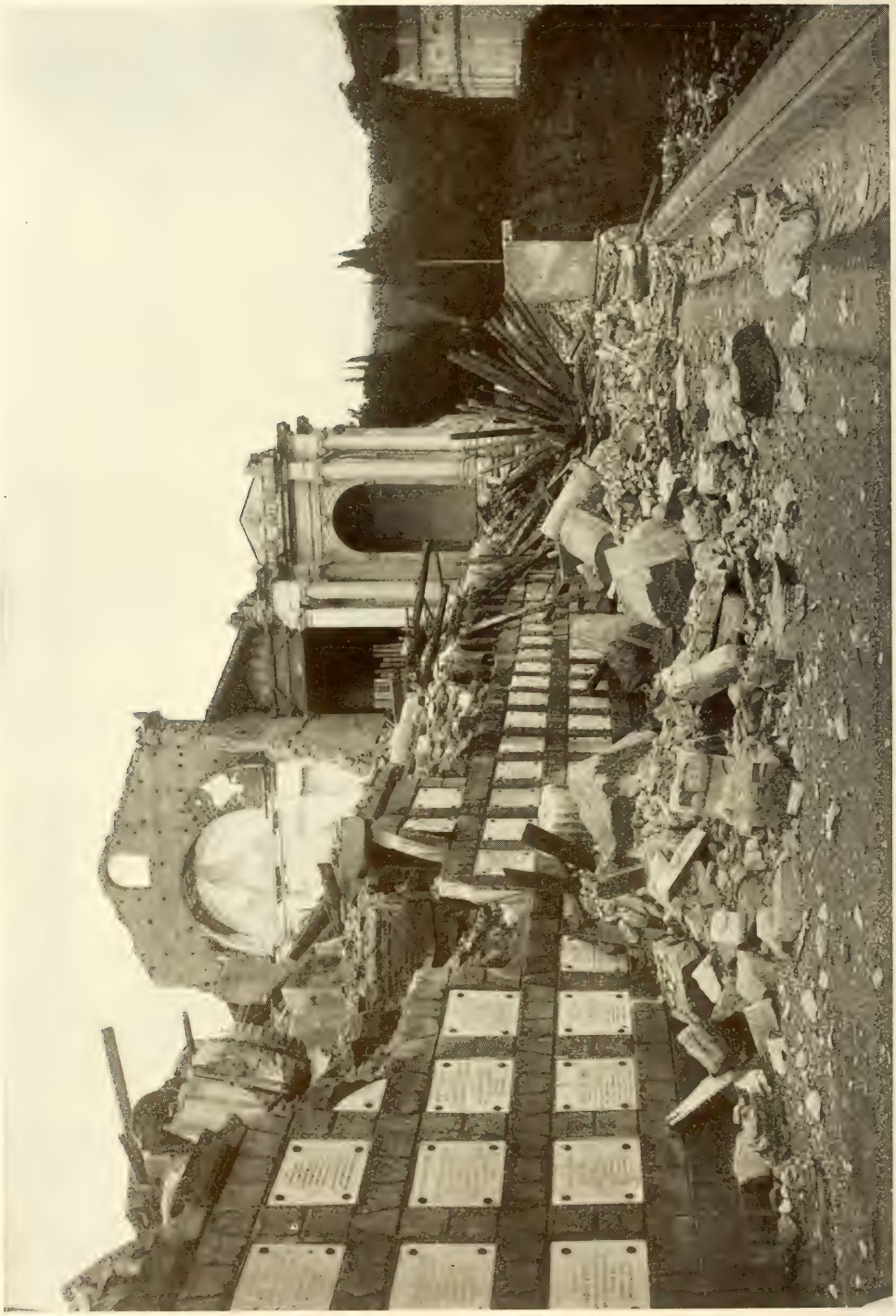
BURIED ALIVE FOR 18 DAYS

Francesco Minissale, a young lad of ten, shown in the picture on this page and his two sisters, Giovannina and Nataline, 14 and 16 years of age, probably

FRANCESCO, THE LAD WHO DUG HIMSELF OUT OF THE RUINS OF MESSINA, WHERE HE AND HIS TWO SISTERS WERE IMPRISONED FOR 18 DAYS

had the most remarkable experiences of any survivors. It was my pleasure to meet them on board a freight steamer through the kindness of its captain. This is their seemingly incredible tale:

"We were sleeping in a large room on the ground floor. Our house collapsed, killing our mother and imprisoning us. Providentially, in the same room there was food which we had purchased for the New Year's feast—figs, cookies, a bag of onions, a bottle of vinegar, and besides these there was a small barrel of water into which a large bottle of oil had tumbled and been broken, but the oil was not lost. On these provisions we lived, but were never very hungry. Fresh water and fresh air were what we wanted most. The room was quite dark, and although we were there for 18 days it hardly seemed more than four. Finally Francesco began pounding the plaster wall with a cobble-stone, breaking it down bit



THE TOMBS OF CAMPO SANTO JUST SOUTH OF MESSINA WHICH WERE OPENED BY THE EARTHQUAKE

CATHEDRAL IN REGGIO SHOWING TOTAL WRECKAGE
This church was noted for its beautiful mosaic decorations

ROOM IN WHICH THE AMERICAN CONSUL, DR CHENEY, AND HIS WIFE, WERE KILLED

A SACRED TOMB IN THE DUOMO OF MESSINA WHICH WAS NOT SPARED BY THE EARTHQUAKE

by bit, until there was an opening large enough for him to scramble through into the adjoining room and up over the debris to the surface, where he was hailed by an officer. He told his incredible tale and we were all rescued."

Their father was in New York at the time, and after learning of their safety he wrote that he would start on the *Republic,* the fate of which they learned later. They had not had further news from him, but anticipated his arrival every day. Each survivor had his own tale of woe, and many of these have been presented in recent magazine articles.

A great sorrow, but not one of suffering, was the death of Dr and Mrs Cheney. The search for their bodies was begun by Italian soldiers, who were relieved later by American sailors. Both bodies were found on January 15 in bed, and death had evidently been instantaneous.

Though the American war ships did not arrive in the vicinity of the earthquake until January 10, somewhat late to lend any great assistance, still the effect of the sympathy expressed by the President, the magnitude of the sum appropriated by Congress, the prompt offer to send the fleet under Admiral Sperry to Messina, the activity of Ambassador Griscom in the relief work in Rome and that of the American Red Cross, all inspired creditable comment in the Italian newspapers and gratitude in the hearts of the people.

Since the day of devastation the Italian army has done noble work in accomplishing the task before it, and both the soldiers and sailors deserve great credit for their bravery and endurance.

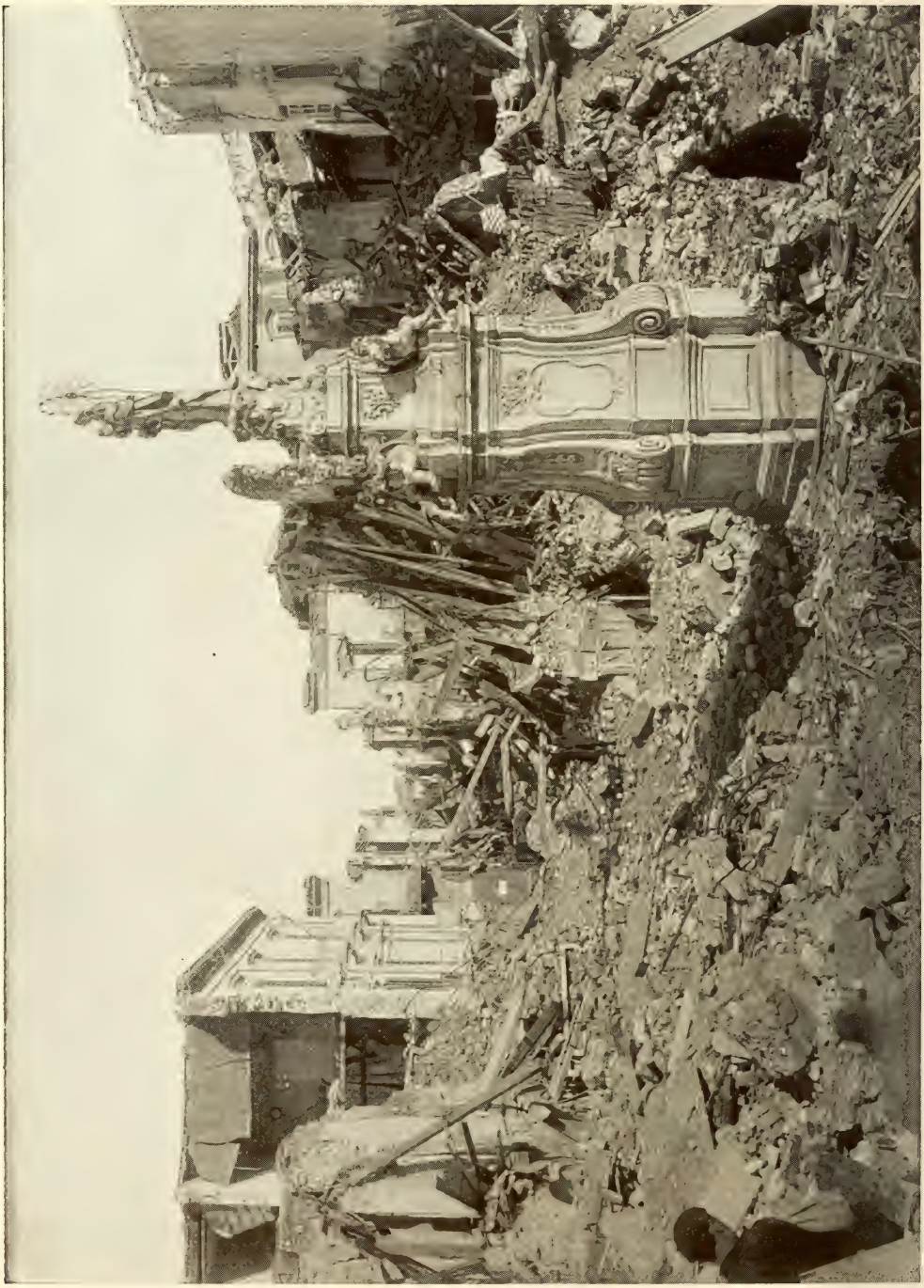
COMPARISON WITH THE SAN FRANCISCO EARTHQUAKE OF 1906

In San Francisco the earthquake caused little loss of life from falling structures and the houses left little debris. The main problem was fire-fighting, securing order and safety of life and property, supplying food and water to 350,000 and shelter to 175,000 people. Telegraphic and railway communications were not destroyed and notification of disaster to the rest of the world was prompt. The army and navy in and near the city were unhurt, and with them supplies were made available and promptly distributed.

At Messina and Reggio the initial shock caused the principal damage, and the loss of life was due mainly to falling structures, the loss by fire being unimportant. Telegraphic and railway communication was cut off and assistance had to come by sea. The army and navy in the vicinity suffered heavily, Messina losing two-thirds of her garrison and all supplies. The problem was to rescue and care for the wounded, to establish order and safety to life and property, to dispose of the dead, and give food and water to the living, a tremendous task, indeed, when one views the vast area of destruction. Thus we find that while the buildings in San Francisco were more properly constructed to withstand shocks, those in Messina were better able to resist destruction by fire.

A FACTORY JUST SOUTH OF MESSINA
The top of the chimney was thrown to the southeast

PIAZZA DOGANA: MESSINA
"Some buildings are only deprived of their front walls, leaving exposed to view the interiors of rooms with overturned chairs and wall pictures slightly out of adjustment"



PIAZZA IMMACULATA AND CORSO CAVOUR, SHOWING A MONUMENT OF GOOD CONSTRUCTION INTACT AND BUILDINGS OF POOR CONSTRUCTION TOTAL WRECKS

WRETCHED TYPE OF BUILDINGS

Architecturally many of the buildings of Messina were superb, the effect of strength being emphasized by massive walls and columns. But when one investigates the details of construction and of material used both features are found to be deficient. A worse type of structure within an area frequented by earthquakes is difficult to imagine. The houses, which were from two to four stories high, were built of round cobbles or rubble cemented together with a poor mortar which is sadly lacking in strength; even the walls are not bound together, the cross-beams for a floor being set in rows of indentations left in the wall at the time of construction. On these cross-beams, which are often only wooden poles, the tiled floors are laid, and the roofs, too, are generally covered with heavy tiles. The effect of the earthquake is quite evident; the walls of the buildings cracked readily and spread sufficiently to permit the heavy floors and roofs to drop to the ground; the walls thus being freed, subsequent shocks caused them to tumble on top of the already partially wrecked building, completing its destruction. Thus they collapsed amid suffocating clouds of dust into a hideous conglomeration of rubble, mortar, and furniture, forming regular deadfalls for man.

HOW WILL MESSINA BE REBUILT

In the Italian Parliament a week after the disaster it was said that "Messina shall rise again." This bold proposition was applauded vigorously and initial appropriations were immediately made. But it is not enough to make propositions and endorse them with vigor. Over three months have passed since the disaster with no attempt to rebuild. A commission, consisting of seismologists, geologists, and engineers, was formed to determine the questions when, where, and how reconstruction could best be accomplished. They are still debating and it may be months before any definite steps will be taken. Messina is one of the essential ports of the world, both from commercial and military standpoints. Its strategic position, like Gibraltar, commands a ship's highway and in its harbor a whole fleet may hide in safety. Any one knowing its situation cannot doubt but that the risk will be taken and a new city built.

As to "when" reconstruction shall begin there is little difference of opinion, the answer being "as soon as possible." The first necessity will be to remove the present debris, which is estimated to amount to 1,000,000 tons. From this mass of wreckage there are still about 40,000 bodies to be recovered and buried before the place is even fit to live in. Thus to prepare the present site so that construction work could begin will take at least a year and probably longer.

The second question, "where," cannot be answered until careful scientific investigations of the entire area now in progress have been completed, and even then the selection of a site will necessarily be governed by the military and commercial requirements. I have heard suggested for a possible site the area just south of Gazzi, about 3 miles south of the harbor, as here the gravel bench is not deep and the buildings did not suffer as much damage as those at Messina. The slopes of the mountains where solid rock foundation occurs and where small villages were unhurt have also been suggested, but such a site would not be practicable from a commercial viewpoint. This selection of a new site is a perplexing task, and in the end the property-owners and the sentiment of the people may prompt the rebuilding of the city on its present location.

This second question decided, then the third, the most important of all, will have to be carefully considered. How should the city and towns along this unstable coast line be rebuilt? To begin with, the streets of the city should conform with the direction of the straits, which is said to be parallel with the direction of the seismic wave, for it was noted that buildings along streets which run diagonally to this direction were more greatly shattered. It was also noted that buildings

VIEW ALONG QUAY IN MESSINA SHOWING A DISPLACEMENT CAUSED BY LOCAL LAND-SLIPPING

of one and two stories were much less damaged than those of three and four stories, and that many houses were traversed by cracks running north and south.

To determine the character of the construction to be employed, the engineers have the reports on the San Francisco, the Japanese, and other earthquakes, which discuss fully the effect of an earthquake on all the varied types of structure. With these and their present knowledge of the structures in Messina there is every reason to believe that they will decide upon an individual type especially adapted to this region that will give great resistance to earthquake shocks. To the government will fall the duty of enforcing the use of this type of structure. With buildings properly constructed the destruction by earthquakes to life and property will be minimized, so that cities and towns along the straits will be much safer to live in.

WHAT EARTHQUAKES ARE

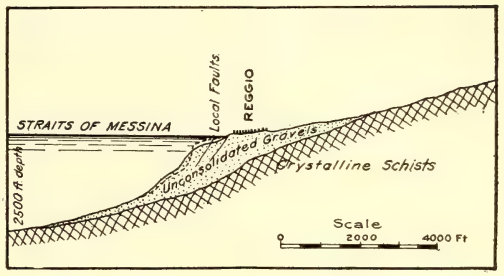
Earthquakes are tremors or shakings of the ground naturally produced. They are superficial phenomena resulting from a subterranean shock which is transmitted as an elastic wave through the material of the earth's crust. From points of initial disturbance these waves pass out in all directions. They are caused by volcanic explosions and accompany the development of mountain structure. With the contraction of the earth's crust and adjustment of land masses powerful strains, consisting of terrestrial pressure or tension, are developed, and wherever and whenever such strains suffice to overcome the elasticity of the rocks involved, either viscous flexure or rupture must result. A dislocation or tectonic earthquake, therefore, is simply the jolt or jar produced by a sudden movement of the crust along a fault

plane or system of planes and its sudden arrest. The sudden dropping of a section of the crust for only a few inches could cause excessive jarring of the ground. Earthwaves or undulations are caused by these jarrings, which are transmitted outward from the center or centers of disturbance. The rate of propagation is relatively fast through rock masses, but the waves are much impeded in rate and increased in amplitude when they traverse beds of gravel, sand, or clay. It is therefore found that the most destructive effects are confined to areas where the surface is occupied by unconsolidated materials, while on adjoining tracts, where solid rock forms the foundation, the buildings often escape injury.

The rock formations which constitute the mountainous masses of the Calabrian province and the northern part of Sicily consist essentially of crystalline schists and gneiss, intruding which are granitic rocks exposed in the northern portion of the area (see map above). The low lands and bottoms of the valleys, on the other hand, are occupied by slightly indurated shales and sandstones of Tertiary and Quaternary ages, and along the shore lines are bench deposits of unconsolidated gravels of recent age. In the vicinity of Mount Etna the area is covered by lava flows and tufaceous beds.

POSSIBLE CAUSES OF THE EARTHQUAKE

The Straits of Messina occupy a deep channel between the two ancient mountain ranges and are bordered by rock formations of relatively recent age. That isostatic readjustment between these two land masses is taking place is believed by many, though whether the crustal movement is due mainly to the transfer of molten rock magma from points below the solid crust, the evidence of which is expressed in the volcanic eruptions, whether there is a sufficient transfer of material on the surface due to erosion to cause excessive local strains in the crust because of this transfer of weight, or whether it may be attributed to some

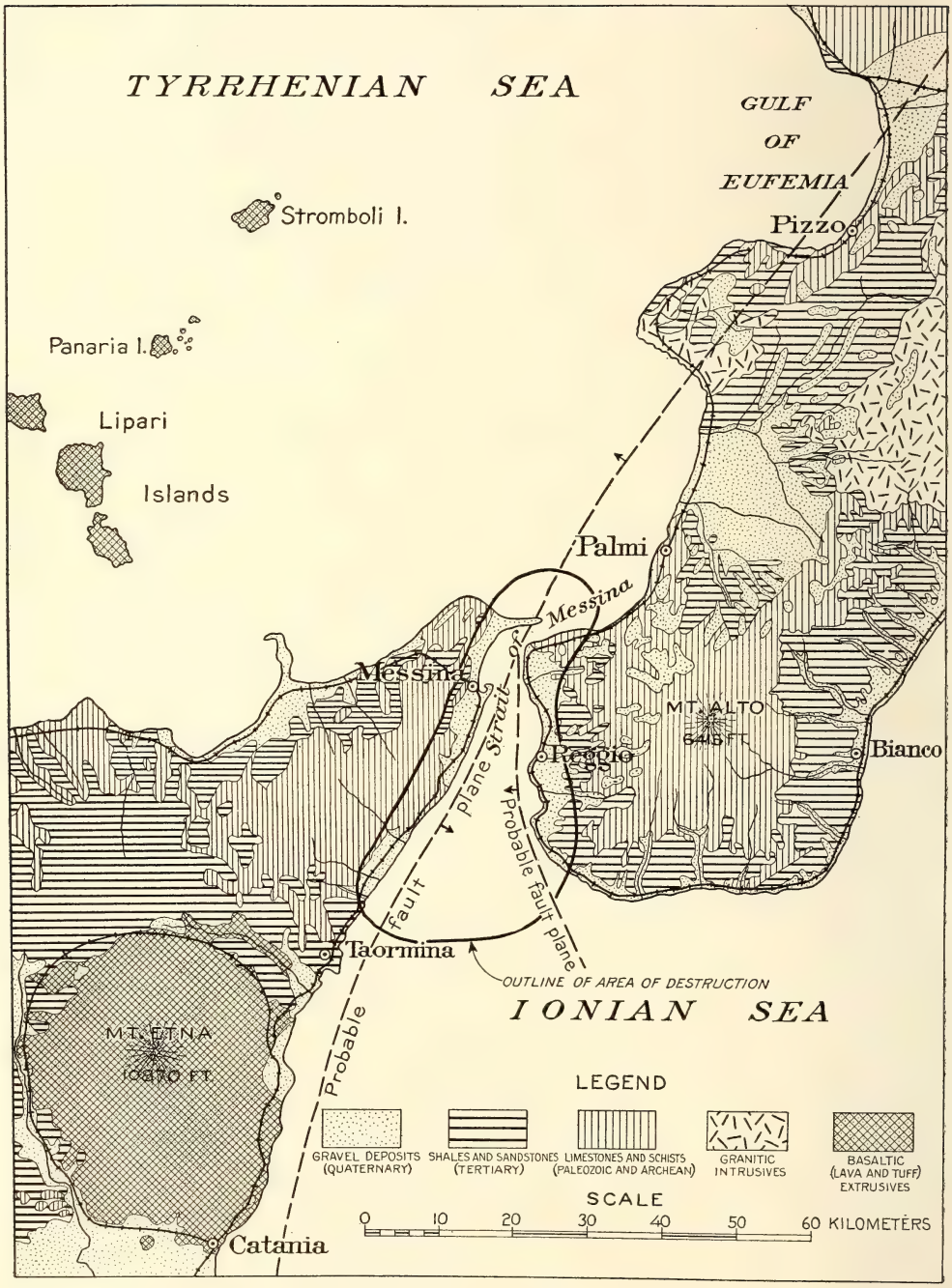


SKETCH SHOWING GRAVEL BEACH DEPOSITS AT REGGIO AND DISPLACEMENTS CAUSED BY LOCAL LAND-SLIPPING

other cause are hypothetical questions. The occurrence of fault planes has been conjectured to be along the bottom of the straits, and, though they have never been seen, there is sufficient geologic and seismographic evidence to believe that they exist, though whether the movement is along one plane or whether it has been taken up by a system of fracture planes or parallel dislocations is not known.

Locally along the shore line of the straits changes occurred, and portions of the quays both in Messina and Reggio were faulted below water level, the local displacements being from 1 to 6 feet. Along the coast are benches of gravel and sand sloping gradually toward the straits and extending a short distance out under tide water, where they end abruptly, and just beyond these the channel has a depth of 1,000 feet, and toward the center it is 2,500 feet below the surface. The earthquake caused a local landslipping of these partially submarine benches, thus producing the displacements observed (see page 393). The greater local sinking at Reggio than at Messina may be attributed to the greater depth of the channel close to the shore, thus causing a greater fall.

If there has been any considerable displacement between the opposite sides of these straits, it must have been a horizontal one, as there has been little or no general vertical change in elevaton of either shore line. This possibility of a horizontal movement of the Sicilian side of the straits to the northwest is suggested



MAP SHOWING THE GEOLOGY IN THE VICINITY OF MESSINA

Compiled from the general geologic map of Italy

PIAZZA MUNICIPALI, SHOWING BUCKLING OF GRANITE BLOCKS CAUSED BY THE SEISMIC WAVE

The city post office is in the background

by the direction of the throw at the time of the earthquake. Most of the towers and chimneys in and about Messina were thrown to the southeast, while in the vicinity of Reggio towers were thrown locally to the north, though on this side of the straits the general direction of the throw was poorly expressed by the structures.

Imagine now local landslides, largely submarine, occurring each side of the straits practically at the same instant; this alone would be sufficient to make the sea recede and cause the tidal wave which followed the earthquake. Theories attributing it to changes in depth of the bottom of the straits must be proven by soundings, and it is doubtful if any perceptible change will be found.

The answers to the questions whether the region may now look for respite or whether it is becoming unfit for human habitation can only be based upon careful consideration of the causes of earthquakes and the history of past earthquakes in this vicinity. That there will be future disasters of this character here is most probable, though it is hoped that the present movement inaugurates a long era of comparative repose.

It is gratifying to know that present studies in seismology are in the direction toward the prediction of place and time of both earthquakes and volcanic eruptions. The malloseismic areas are being outlined, the underlying formations are being studied in detail, past records carefully considered, and thus tracts of special

instability are becoming known. The determination of the time such malloseismic disturbances will be active within these specific areas is a far greater problem, and though many hypotheses based on rhythmic recurrence, alternation between different parts of a district, precipitation, etc., are being developed, still solution of this vital question, the forecasting of earthquakes, belongs to the indefinite future. Thus the areas of peril may be definitely known, and though the time is indefinite, necessary precautions in the construction of earthquake-proof houses within such areas will insure both life and property against the great losses caused by these destructive forces.*

*The reader is referred to "Earthquake Forecasts," by G. K. Gilbert, in Science, vol. XXIX, No. 734.

THE AMERICAN RED CROSS IN ITALY

By Mabel Boardman

Director of the American Red Cross

BESIDES the Congressional appropriation of $800,000 for aid to the sufferers of the Italian earthquake, the American people have contributed a million dollars through the American Red Cross. This generous and practical expression of our sympathy for the victims of the terrible disaster has been expended in various ways. Knowing that the Italian Red Cross, with its equipment for field hospitals, hospital trains and ships with their personnel, was specially fitted to assist in the care of the great numbers of injured, $320,000 was contributed through Mr Griscom, our Ambassador at Rome, to this sister organization in Italy.

As Mr Bayard Cutting, Jr., the American Consul at Milan, was sent by our government directly to Messina to look after American interests there, he, on request, kindly consented to act as the American Red Cross representative, and $15,000 was transmitted to him to be used for the benefit of any Americans among the sufferers, and for what other immediate purposes he thought best. As only one Italian-American family was in need of assistance, Mr Cutting used much of this fund for the aid of local committees engaged in such relief work as caring for the injured, employing the well, and providing food and clothing for the destitute.

On Mr Griscom's suggestion, $100,000 was cabled him for the "Red Cross relief ship *Bayern*," which, thanks to the energy of Mr Griscom and his American committee at Rome, entered the harbor of Messina just sixty hours after it was chartered at Genoa, under command of the U. S. Naval Attaché at Rome, Commander R. R. Belknap. It flew the Red Cross flag and carried members of the committee, a capable medical and nursing personnel, and a large cargo of food, clothing, and hospital supplies. Going from port to port—Messina, Catania, Reggio, and Palermo—it distributed its life-saving stores.

Of the ship fund, 150,000 lire was carried in money, which proved of great use, particularly in aiding the invaluable work of Miss Davis, of the Woman's Reform School of New York State, who, chancing to be at Syracuse, Sicily, had promptly instituted employment work for the men and women refugees. The former were employed in house-building, shoemaking, and the unskilled labor in road construction, and the women in the making of clothes. Thanks to this initiative, employment stations were also started in Palermo, Red Cross funds being provided from the *Bayern* for this purpose.

To Mr Griscom was also sent $50,000 to aid in the all-important rehabilitation work. For the administration of this

fund the Prime Minister appointed an Italian committee of prominent men and women. By the purchase of tools for laborers, instruments for professional men, small stocks for petty storekeepers, sewing machines for women, many of the unfortunate people can be again placed on a self-supporting basis.

At the request of *The Christian Herald,* which raised the money, $50,000 was forwarded through the Italian Ambassador in Washington to the Queen for the immediate care of widows and babies, and $5,000 contributed by the same generous paper was sent for the relief of Waldensian sufferers in Sicily.

Upon further suggestion from Mr Griscom, after consultation with the Italian government, $250,000 was contributed for the maintenance of an agricultural colony for the care of children left dependents. This institution is to be called "The American Red Cross Orphanage." The American Ambassador at Rome is to be an *ex officio* member of its board. It is to be established in Sicily or Calabria, the government providing the land and the national committee the buildings. The children will be educated as practical agriculturalists by government experts.

BUILDING HOUSES

Some $20,000 more sent to Mr Griscom, together with $17,000, a balance left from the Relief Ship Fund, is being expended as part of our Red Cross work in the rebuilding of one of the ruined villages of Calabria. Between two and three hundred wooden houses are to be constructed from lumber purchased in Naples, and a small hospital is also to be built.

The greatest need today is for shelter. The purchase of materials for over two thousand houses and the chartering of ships for their transportation was the wise use to which $500,000 of the Congressional appropriation was applied. The Red Cross also expended $107,000 for some six hundred houses and the chartering of a ship for their transportation.

The funds for the building of both the American Red Cross houses and those given by our government are also being provided by our Red Cross, $48,000 having been forwarded for that purpose. The National Director of the American Red Cross having been sent to Italy, $14,000 has been placed to his credit in Rome for such relief measures as he may advise after consultation with Mr Griscom. It is possible that this amount, with a further appropriation, may be required for the construction of small brick ovens for the houses, as the use of stoves among the poorer classes is unknown in southern Italy.

The American houses are being built mainly at Messina and Reggio. Each house is 20 by 16 feet, and, unlike the long structures built by some of the other countries, stands by itself and is clapboarded. Some of those already built have been placed in groups of twelve around rectangles, five on the sides and one at each end, the Italian government donating the land.

The total amount so far expended through the American Red Cross for the Italian relief work amounts to $976,000. Our people have been glad to help their unfortunate fellow-men in southern Italy, and from no portion of our land has the response been so generous as from California, so lately itself the scene of a great disaster.

SHACKLETON'S FARTHEST SOUTH

ALL records for South Polar exploration have been surpassed by Lieut. E. H. Shackleton, R. N., who is now returning to England after fourteen months spent within the Antarctic Circle. Shackleton, on January 9, 1909, gained a point within 111 miles from the South Geographical Pole, while another of his parties actually reached the South Magnetic Pole on January 16, 1909, according to press dispatches from New Zealand. He has shown that the Geographical Pole is situated on a high plateau about 10,000 feet above sealevel, and that the remarkable floating ice-barrier stretching for 500 miles between King William VII Land and Victoria Land, and justly called one of the wonders of the world, does not apparently reach beyond the eighty-third degree. But to Americans his most interesting discovery is new land and mountain ranges extending from South Victoria Land, which once more confirms the great discoveries of the American Wilkes, made nearly seventy years ago. (See page 402).

Lieutenant Shackleton, with a party of about 15 men, dogs, Siberian ponies, motor cars, and other equipment, was landed from the *Nimrod* in January, 1908, at Cape Royds, near the base of the smoking volcano, Mount Erebus. Here he made his headquarters for the year at the same base used by the previous British Antarctic Expedition (1901-1904), led by Captain Scott, whose splendid achievements were described in this Magazine in February, 1907. The motor cars proved apparently of little value during the ensuing year's work, owing to the crevasses in the ice, but the Siberian ponies showed remarkable endurance of cold and great pulling power.

Campaigning against the Pole in some respects is easier in the south than in the north. The weather is much harsher and more boisterous in the south, but the working season is longer. The North Pole is surrounded by an ice-covered ocean, which must be crossed in spring before the ice breaks apart under the summer sun. The South Pole, on the other hand, is situated on a great ice plateau, which may be traversed during almost the entire period of daylight. Thus, while Peary must complete his dash from the most northern land to the Pole and back in a period of about sixty days, the South Polar explorer has more than one hundred and twenty days at his disposal.

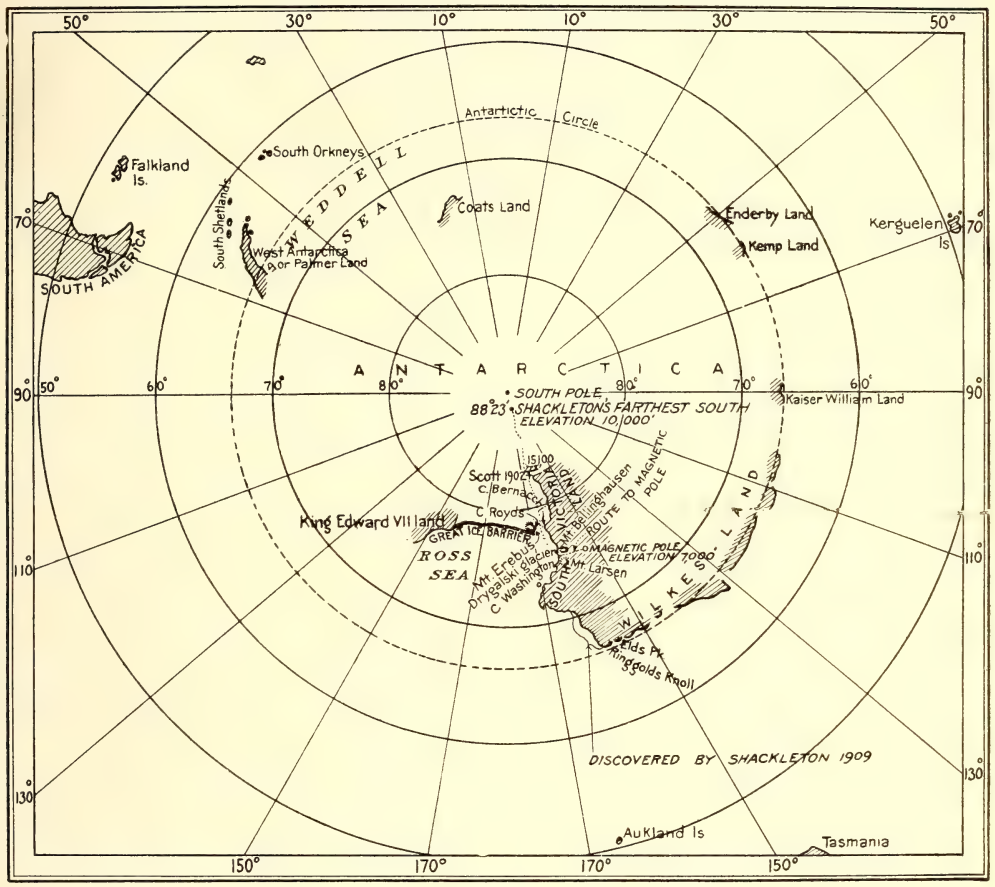
Lieutenant Shackleton not only won the record for farthest south, but he has reached a point nearer the South Pole than any explorer has been able to approach to the North Pole. The story of his year's work, as given in the cable dispatches from New Zealand, follows:

The southern party—Adams, Marshall, Wild, and I—with four ponies and a supporting party, consisting of Sir Philip Brocklehurst and Messrs. Joyce, Marson, Armytage, and Priestly, left Cape Royds on October 29, 1908, with ninety-one days' provisions. The supporting party returned on November 7.

Owing to the bad light among the ice crevasses, Adams and a pony were nearly lost. We reached on November 13 the depot laid out in September in latitude 79° 36′, longitude 168° east. We took on a pony the maize and provisions previously left there and commenced reducing our daily rations.

We traveled south along meridian 168 over a varying surface, high ridges and mounds of snow alternating with soft snow. The ponies often sank to their bellies. In latitude 81° 4′ we shot the pony Chinaman and made a depot of oil, biscuit, and pony meat. The remainder of the pony meat we took on to eke out our dried rations.

On November 26 we reached the *Discovery* expedition's southernmost latitude. The surface was now extremely soft, with large undulations. The ponies were attacked with snow blindness. On November 28 the pony Grisi was shot. We made a depot in latitude 82° 45′, longitude 170°. The pony Quan was shot on November 30. We had now traveled 400 miles across the ice barrier.



OUTLINE MAP OF SOUTH POLAR REGIONS

Steering south and southeast, we were now approaching a high range of new mountains trending to the southeast. We found on December 2 the barrier influenced by great pressure and the ridges of snow and ice turned into land. We discovered a glacier 120 miles long and approximately 40 miles wide, running in a south and southwesterly direction.

ASCENT TO THE CONTINENTAL PLATEAU

We started on December 5 to ascend the glacier at latitude 83° 33′, longitude 172°. The glacier was badly crevassed as the result of huge pressure. The surface on December 6 was so crevassed that it took the whole day to fight our way 600 yards.

On December 7 the pony Socks, breaking through a snow lid, disappeared in a crevasse of unknown depth. The swingletree snapping, we saved Wild and the sledge, which was damaged. The party was now hauling a weight of 250 pounds per man.

The clouds disappearing on December 8, we discovered new mountain ranges trending south and southwest. Moving up the glacier over the treacherous snow covering the crevasses, we frequently fell through, but were saved by our harness and were pulled out with the Alpine rope. A second sledge was badly damaged by knife-edged crevasses.

Similar conditions obtained on our way up the glacier from December 18, when we reached an altitude of 6,800 feet. In latitude 85° 10′ we made a depot and left everything there but our food, instruments, and camp equipment, and reduced rations to twenty ounces per man daily.

We reached on December 26 a plateau, after crossing ice falls, at an altitude of 9,000 feet, thence rising gradually in long ridges to 10,500 feet.

Finishing the relay work, we discarded our second sledge. There was a constant southerly blizzard, wind, and drifting snow, with the temperature ranging from 37 to 70 degrees of frost. We lost sight of the new mountains on December 27.

Finding the party weakening from the effects of the shortage of food and rarefied air and cold, I decided to risk making a depot on the plateau. We proceeded on January 4 with one tent, utilizing the poles of the second tent for guiding marks for our return. The surface became soft and the blizzard continued.

WITHIN 111 MILES OF THE POLE

For sixty hours during January 7, 8, and 9 the blizzard raged, with 72° of frost and the wind blowing seventy miles an hour. It was impossible to move. Members of the party were frequently frostbitten in their sleeping bags. We left camp on January 9 and reached latitude 88° 23′, longitude 162°.

This is the most southerly point ever reached. Here we hoisted the Union Jack presented to us by the Queen. No mountains were visible. We saw a plain stretching to the south.

We returned to pick up our depot on the plateau, guided by our outward tracks, for the flags attached to the tent poles had been blown away. Less violent blizzards blowing at our backs helped us to travel from twenty to twenty-nine miles daily. We reached the upper glacier depot on January 19.

The snow had been blown from the glacier surface, leaving slippery, blue ice. The descent was slow work in the heavy gale. The sledge was lowered by stages by the Alpine rope.

On the morning of January 26 our food was finished. It was slow going. Sixteen miles were covered in twenty-two hours' march. The snow was two feet deep, concealing the crevasses. We reached the lower glacier depot in latitude 83° 45′ on the afternoon of January 27. There we obtained food and, proceeding, reached the Grisi depot, named after the dead pony, on February 2.

There was no food remaining. Wild was suffering from dysentery, the effect of horse meat. The entire party were prostrated by dysentery on February 4 and were unable to move. The dysentery continued eight days, but helped by strong southerly blizzards we reached Chinaman depot on February 13. The food had again run out.

The blizzards continued, with 50° of frost. We discarded everything except our camp outfit and geological specimens and on February 20 reached the next depot, all our food being finished.

Helped by the southerly blizzard, which was accompanied by 67° of frost, we reached on February 23 a depot on Minna Bluff, which had been laid by the Joyce party in January. Here we received news from the ship. Marshall had a relapse and return of dysentery.

We made a forced march of twenty-four miles on February 26. Marshall was suffering greatly. On February 27 Marshall was unable to march. I left him in camp in charge of Adams, while Wild and I made a forced march to the ship for relief. I returned on March 1 with a relief party, and all reached the ship at Hut Point on March 4 in a blizzard.

The total distance of the journey, including relays, was 1,708 statute miles. The time occupied was 126 days. The main result is a good geological collection. We found coal measures in limestone. We also made a complete meteorological record. We discovered eight distinct mountain ranges and more than a hundred mountains. We surveyed and photographed many glaciers and found signs of former greater glaciation.

The Geographical South Pole is doubtless situated on a plateau, from 10,000 to 11,000 feet above the sea level. The new mountains' altitudes range from 3,000 to 12,000 feet approximately. The violent blizzards in latitude 88° show that if the "polar calm" exists it must be in a small area or is not coincident with the Geographic Pole.

LOCATING THE MAGNETIC POLE

The northern party, consisting of Douglas, Marson, Rackay, and Davis, left Cape Royds for the Magnetic Pole on October 5, 1908. We picked up the depot left by the motor car fifteen miles out. The party hauled two sledges by relays, the total weight being 600 pounds per man, with provisions for ninety-three days.

The thawing sea ice, compacted of brush and crushed pack, made progress laborious and slow. The sea ice south of the Drygalski Glacier was beginning to break up. The first attempt to cross to the glacier failed, owing to numerous deep chasms. We crossed further east on December 6, and followed a difficult route over crevassed pressure ridges.

We attempted the glacier between the mountains Nansen and Larsen. After sledging among high pressure ridges, where the sledges and party were often nearly lost in the crevasses, we abandoned that route. A blizzard then covered the glacier deeply drifted with snow and the sledges were extricated with difficulty.

Subsequently violent blizzards removing the loose snow enabled the party to ascend the steep slope of a branch glacier to the main glacier between the mountains Larsen and Bellinghausen. Thence there was fair traveling to an inland plateau at an altitude of over 7,000 feet. Strong southerly winds, 50° of frost, and shortened rations made traveling trying.

The party reached the Magnetic Pole, 260 statute miles northwest of the Drygalski depot, on January 16, and hoisted the Union Jack. The position of the Pole was determined by Marson with a Lloydreak dip circle as in the vicinity of latitude 72° 25′, longitude 15° 4′ east.

The duration of the journey was 122 days. We traveled, including relays, 1,260 statute miles. The coast was triangulated by Marson with a theodolite from McMurdo to the Drygalski Glacier. There are also geological, magnetic, and meteorological results. Minerals, apparently vanadium and widely spread monastite, were found.

In March, 1908, a party headed by Lieut. Adams, left Cape Royds to ascend Erebus, the great Antarctic volcano. They climbed with a sledge to an altitude of 5,500 feet, thence carrying their equipment on their backs. They reached an altitude of 9,500 feet on March 7. The temperature was 50° below freezing. Then a violent blizzard raged for thirty hours. Resuming the ascent on March 9, they reached the old crater of the volcano at over 11,000 feet.

Unique fumaroles or smokeholes were found. The old crater was chiefly filled with large felspar crystals, pumice and sulphur. Sir Philip Brocklehurst had both feet badly frostbitten. One toe was subsequently amputated. The summit was reached on March 10. The active crater is half a mile in diameter and 800 feet deep. It was ejecting vast volumes of steam and sulphurous gas to a height of 2,000 feet.

WILKE'S DISCOVERIES CONFIRMED

The *Nimrod* on the voyage to pick up the expedition reached the ice sheet off Mt. Erebus on January 3. Various parties of the expedition were taken on board at different points, Lieut. Shackleton's being the last, on March 4.

On the voyage homeward in the *Nimrod* from latitude 69° 48′, longitude 166° 11′, they discovered a new range of coast mountains trending first southwest and then west. The approximate altitude of these mountains is from 5,000 to 7,000 feet. They are mostly tabular and form part of an apparently deeply eroded plateau. This discovery by Shackleton is an extension of South Victoria Land westward to about 70° 30′ south, 162° east, which appears to render certain its continuity with Wilkes Land.

Gen. A. W. Greely, in his admirable "Hand-book of Polar Discoveries," successfully demonstrates the general correctness of Wilkes' discoveries, which were acrimoniously disputed by Captain Ross, R. N., whose own Parry Mountains have been proved non-existent. The very high land seen by Wilkes, when he discovered the Antarctic continent, on

January 19, 1840, is only separated from Shackleton's discovery by about 250 miles.

The ends of the globe are as far apart in character as in distance. General Greely, in his "Hand-book of Polar Discoveries," gives the following interesting comparison of the polar areas:

The lands within the Arctic Circle are not alone contiguous to powerful and enterprising nations, but are also so favored by climate and soil as to present suitable conditions for animal and plant life. Indeed, Arctic Europe, Asia, and America present large habitable districts, where human activities afford life environments not altogether harsh or unattractive. In addition the northern seas, filled with abundant life, furnish subsistence and wealth to thousands of daring men who yearly seek their accessible waters.

At the other Pole of the world we find the Antarctic region to be the true land of desolation—forbidding, inaccessible, and uninhabitable. Its northern confines and surroundings are largely oceanic, so that freezing temperatures, fierce snow-blizzards, and other winter conditions are not unusual in midsummer. While in high latitude near the South Pole there are extended lands and doubtless a continent, yet these are sterile areas, overlaid with ice-coverings of vast extent and enormous thickness.

It is doubtful if one per centum of Antarctic lands is ever ice-free, so that ordinary forms of land-life are absolutely wanting. Not only are human inhabitants unknown south of Cape Horn, more than 2,300 miles from the Pole, but, except sea forms, within the circle animal life and vegetable life are practically absent save a few low forms of hardy lichens and mosses. No plant life gladdens the eye, and even the hum of insects is unheard, the terrestrial fauna consisting of wingless insects. Sea life is more abundant than in any other ocean, the higher forms being whales, seals, and birds—skuas, penguins, and petrels—but owing to distance and danger their pursuit and capture are no longer remunerative.

On the Canal Zone. By Thomas Graham Grier. With illustrations and map. 6 x 9 inches. Chicago: Wagner & Hanson. $1.00.

The author, a well-known electrical engineer of Chicago, has brought back from Panama a quantity of interesting information and photographs and compiled them into an attractive book. The trip to the Isthmus is in the form of a diary, and the rest of the book is divided into chapters, giving accounts of the cities of the zone, the canal, the locks, and the labor question. Much interesting data regarding the commissary, sanitation, amusements, etc., is given, and Mr Grier has warm words of praise for the way the work of the canal is being pushed forward and the improvements that have come about since the American occupation of the zone, and concludes with the following strong endorsement: "The force at work is efficient and energetic, having behind it the spirit and the brains of men who are able and intelligent."

Among the Wild Tribes of the Afghan Frontiers. By T. L. Pennell, M. D. Pp. 324, 6½ x 9½ inches. Illustrated. Maps and glossary. Philadelphia: J. B. Lippincott Company. $3.50 *net.*

This book is an unpretending record of sixteen years' good work by an officer—a medical missionary—in charge of a medical station at Bannu, on the northwest frontier of India. The author throws many interesting side-lights on the domestic and social, as well as on the moral and religious aspects of the lives and characters of the tribesmen. Throughout Dr Pennell writes with great simplicity and sincerity; he is careful to confine himself mainly to what he has himself heard and seen; and, above all, he shows that he possesses, in a quite exceptional degree, that insight into the minds of the natives which is the first qualification of any real power of helping and benefiting them. It is altogether a work of singular charm and value, particularly to all those who are interested in the present and future well-being of the native races.

A British Officer in the Balkans. By Major Percy Henderson. Pp. 304; 6½ x 9½ inches. Illustrated. Maps and index. Philadelphia: J. B. Lippincott Company. $3.50 *net.*

Major Percy Henderson has written an interesting record of a lengthy tour through Dalmatia, Montenegro, and Turkey; in Austria, Magyrland, Bosnia, and Herzegovina. The author's account is not that of a hurried traveler, but is the evident result of careful and appreciative observation. He tells of a part of eastern Europe as yet unspoiled by tips or exorbitant hotel charges; of a land possessing all the variety of scenery of Norway, the coloring of Italy, with the added glamour of the Orient. The book is illustrated with many excellent photographs, which were taken by Mrs. Henderson. J. O. L.

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE CALL OF THE WEST*

Homes are being made for Millions of People in the Arid West

BY C. J. BLANCHARD

STATISTICIAN, U. S. RECLAMATION SERVICE

THE Call of the West comes to us today insistent and inviting. Formerly it was a Call of the Wild, a voice from out a vast wilderness of mountains, deserts, and plains.

The iron horse has conquered distance and the barriers long interposed by vast spaces of waterless desert have been thrown down. Irrigation canals long enough to girdle the globe with triple bands have spread wide oases of green in the arid places. Cheerful, prosperous communities dot a landscape once vacant and voiceless.

The Great Plains invite the scientific farmer to overcome the lack of rain by intelligent methods of cultivation and wisdom in seed selection.

The unsurveyed and unexplored mountains await the prospector to disclose mineral riches untold. Countless streams rushing downward from snowy summits, unchecked and uncontrolled, lure the engineer to harness and utilize for the needs of commerce the power now wasted. The desert — mysterious, silent, expectant, quivering under cloudless skies—holds a promise of freedom and independence to the careworn and discouraged. It offers the uplift of unmeasured distances and the individual home with that broader freedom of action which comes with life in the open.

May not the influence of its far-flung horizons and its true perspective be potential in character moulding and building? The cradle of our civilization was rocked in the desert. Plato and Socrates dreamed their dreams, imbibed their splendid imagery and stately rhetoric in a rainless land. May not our own desert develop new systems of ethics and morals to lead us back from the material to the spiritual, into ways of gentleness and simple living.

Untouched by plow, unleached by rain, the desert holds fast the accumulated fertility of ages. It awaits the quickening kiss of canal-borne water to yield abundant harvests and to provide homes for millions of our people.

No national work is of more importance today than that of reclaiming for home-builders an empire which in its

* An address to the National Geographic Society, April 2, 1909.

present state is uninhabited and worthless. To those who dwell on the Atlantic slope it seems a far cry to the Great American Desert in which this work is going forward. Our country is of such vast extent, and the desert is so little known, that the average Easterner gives but slight heed to this particular phase of our industrial development, dismissing the subject as of no personal moment. A more careful consideration of all the factors involved in national reclamation makes it apparent that in many essential particulars the creation of a new commonwealth in the arid West possesses features of interest to every manufacturing city in the East. The completion of each engineering work initiates agricultural development. Compact farming communities are quickly established in the zones of irrigation; villages, towns, and cities follow. Railroads extend their branches to the remotest limits of the new country, bringing the commerce of the world to new markets. In a financial way every large manufacturer in the East is interested in the development which is thus promoted. For many years to come the hundreds of thousands of settlers must look to the East for what they wear, for machinery of all kinds, for many of the necessaries and most of the luxuries they require.

HOMES FOR ONE MILLION FAMILIES

Viewed from other than the commercial aspect, the work of reclamation is of national interest, because it will tend in some measure to relieve the overcrowding and congestion of older settled portions of the country. A conservative estimate is that 30,000,000 acres of land will be reclaimed in the arid West. On this basis there will be homes on the land for more than a million families. Each family on the farm will support another family in the urban communities which will rise in these new agricultural districts.

Looking forward to 1950, when our population is likely to be 150,000,000, who can measure the importance of a work which will guarantee homes and employment for ten millions of people, and which will bring into cultivation such a vast food-producing area.

National reclamation gave a wonderful impetus to private enterprise, and astonishing success in the settlement of large areas has followed the efforts of a number of corporations working in conjunction with state governments. There is more activity on the part of individuals in irrigation work today than in any previous time in our history. The development and growth of our arid states and territories during the past five years have been amazing. Land values have steadily risen and the much-desired subdivision of large holdings is increasing with the rise in values. I believe the time will come, and at no distant day, when the big land-owner will be regarded as an undesirable citizen, and laws will be enacted or taxes so assessed as to make it unprofitable to maintain vast estates of which only small portions are productive, and which furnish no employment for the people. To my mind one of the most cheering features of the present growth of the West is this breaking up of the great estates, many of which were taken from the public domain by methods more or less questionable. Here and there are vast tracts of land held in single ownership, or by corporations, which interpose a barrier to the land-hungry and offer obstacles to the proper development of the country.

In the main, however, the tendency strongly is to subdivide. The great cattle ranches are being cut up in quarter-section farms, and four homes or more to the square mile dot a landscape which a short time ago held perhaps only a lone ranch house within the radius of vision. Ten years ago I drove for two days across a part of Montana and never saw a spot where the virgin sod had been turned. You cannot drive a mile in any direction in that section today without seeing cultivated land.

THE VERSATILITY OF THE WEST

Versatility is not confined to any one locality in the West. In the majesty and

BUILDING A HOMESTEAD OF CONCRETE BLOCKS ON THE TRUCKEE-CARSON IRRIGATION PROJECT, NEVADA (SEE PAGE 427)

TYPE OF THE CENTRALIZED GRADED SCHOOLS ON THE HUNTLEY PROJECT, MONTANA
Two years ago there was not an inhabitant within miles of this school-house (see page 408)

A TWO-YEAR-OLD HOMESTEAD ON THE TRUCKEE-CARSON PROJECT, NEVADA

200 COLONIES OF BEES ON THE SAME PROJECT (SEE PAGE 427)

grandeur of its mountains, lifting their heads into regions of perpetual snow; in forests whose age antedates the birth of the Savior; in canyons whose picturesque carving consumed centuries upon centuries of time; in landscapes and scenery of such beauty and color as were never shown on canvas; in deserts where life is still elemental and primitive, and where amid the crumbling ruins of departed races strange people dwell in an atmosphere of dreams and enchantment, and with mythology and legends as interesting as those of ancient Greece; in all that Nature has ever done to enthrall the senses, to inspire the tongue or pen, the West suffers not by comparison with any part of the Old World. We show but faint regard for all the wonders Nature has lavished on our country when so few of us ever seek to enjoy them. A few of the millions spent annually by Americans in foreign lands, if expended at home, would make easy of access and enjoyment for thousands of our people many of the splendid attractions of our own country.

The man from the West sojourning for a time in the East, if he gives free expression to the pride he rightly feels in his native heath, is likely to be regarded as an apostle of discontent by those who listen. Lucky for him if he does not achieve the reputation for veracity given to an old fellow in the middle West.

The oldest inhabitant and the man who remembered the weather for fifty years back were seated about the stove in the corner grocery one winter's night discussing the veracity of old Si Perkins. Uncle Bill Simpkins strolled in and took his place near the box of soda-crackers.

"Say, Uncle Bill," they asked him, "would you call Si Perkins a liar?"

"Wall," said Uncle Bill, thoughtfully, as he spat in the stove, "I don't know as I'd go so fur as to call him a liar exactly, leastways not just plain every-day liar, but I do know this much: when feedin' time comes, in order to git any response from his hawgs, he has to git somebody else to call 'em fer him."

It is with no wish to encourage unrest and dissatisfaction with your present invironment that I am here tonight. I come rather as a messenger from a far-off and little-known part of our country, bringing a story of progress and achievement. It is a story in part of kinfolks of ours whose hearts are fired with the same courage, patriotism, and fortitude which enabled our ancestors to wrest a commonwealth from the New England wilderness. They are imbued with high ideals and noble purposes, and by their achievements are establishing us more firmly in our place among the greatest nations of the earth.

THE MIRACLE OF IRRIGATION

The miracle of irrigation, which is performed each year in the arid West, is a most impressive and wonderful manifestation of Nature's beneficence to man.

Throughout the winter season the clouds of heaven are swept hither and thither about the uplifted mountains, whose heads tower a mile above the plain. On their frowning fronts and lofty summits the snows fall heavily, covering deeply every peak and promontory and filling every chasm; then the warm rays of spring and summer sun fall softly upon the white snow-banks and tiny streams, and roaring cataracts burst forth and journey downward to fill to overflowing numerous lakes, each a sapphire gem in the heart of the mountains.

The heavy clouds and towering peaks, the falling snow and gentle sunshine, the rush and whirl of descending waters, these are recurring evidences of nature's maternal contributions to the dweller in the desert.

It remains but for man's industry and intelligence to utilize these generous donations. The engineer finds no field more attractive than this for his energies. He curbs the stream with masonry dams and lifts the water into huge canals. Water and land long divorced are wedded, and wavering fields of grain and orchards prolific beyond comparison replace the wastes of sand and sage-brush.

On three previous occasions I have had the privilege of taking the members of this Society, with the aid of the stereopticon, to view some of the wonders of our Far West, and have shown them some of the work of the government's engineers.* We have looked upon the towering structures of granite and concrete, slowly rising to block abysmal canyons; we have in fancy traveled over highways carved from beetling cliffs and traversing waterless deserts; we have seen the surface of the valleys gashed deeply by broad canals carrying whole rivers to fructify a thirsty land. Tonight, while I shall show you more of these creations of daring engineers, it is also my chief aim to make you more fully acquainted with the real purpose of these great works—the making of homes. One of the best examples of the wisdom of the national irrigation law is afforded by the Huntley project, in Montana.

THE HUNTLEY PROJECT, MONTANA

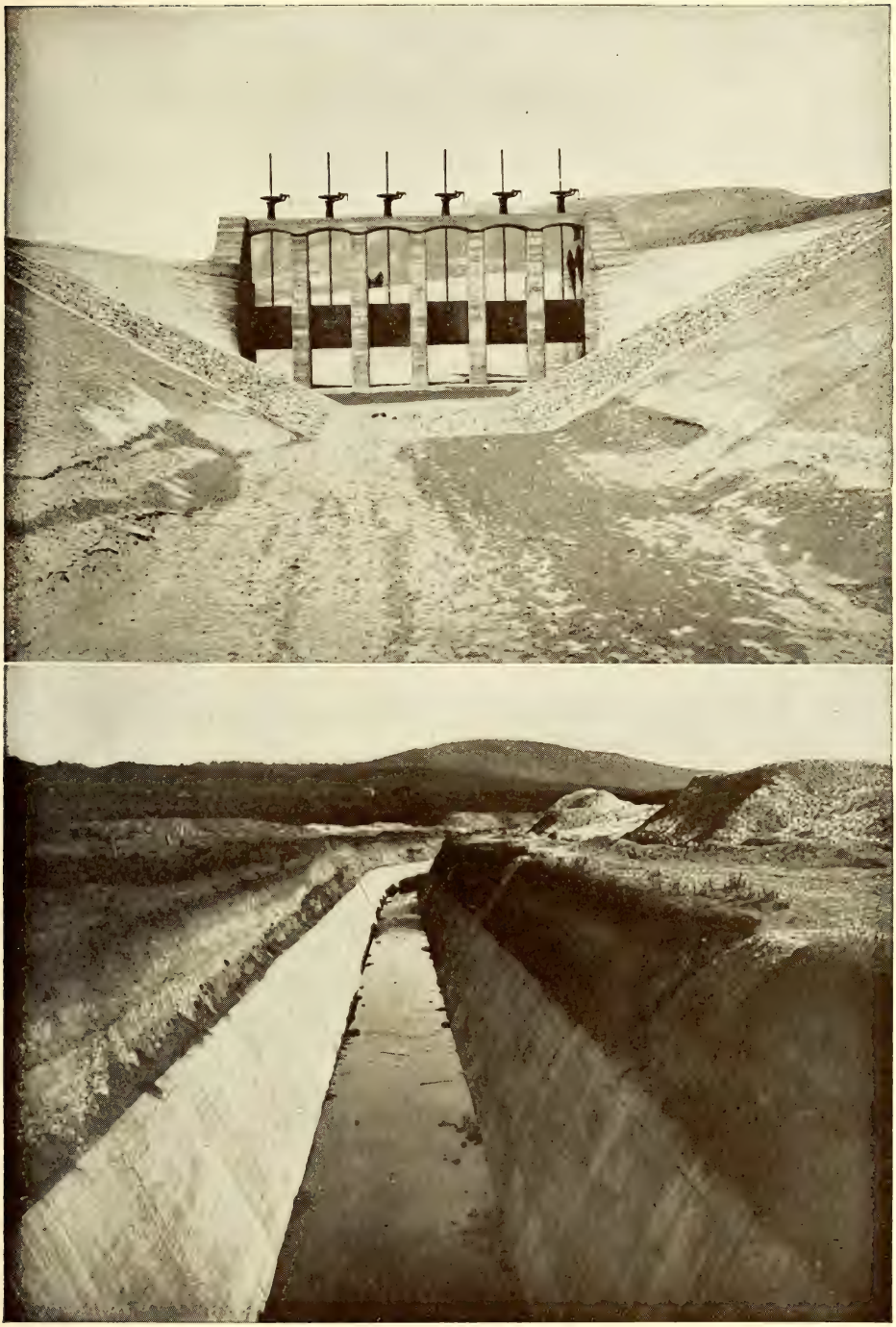
On July 17, 1907, about 30,000 acres of land were thrown open to settlement upon the completion of the irrigation works. This fine tract of land in the valley of the Yellowstone was absolutely virgin; a plow had never scratched its surface. It lay there as nature made it, storing for ages the elements required for plant life. Lacking in rainfall, it produced nothing but sage-brush and bunch grass. To make up for the oversight of nature, a million dollars were expended on irrigation structures and canals. Three hundred families, from all parts of the United States, established themselves upon the 40-acre farms and began at once to erect their simple homes, to clear away the sage-brush, and prepare the lands for crops. To most of them irrigation was an unknown science, to many farming was a new experience. With the cheerful optimism and abiding faith which somehow seem to characterize the dweller in the desert, they set themselves to their several tasks. It was a backward season, a cold, late spring, yet nevertheless every man who sowed reaped some measure of harvest, and in many instances the rewards were beyond reasonable expectation. It is remarkable, but true, that notwithstanding lack of knowledge, unpreparedness of the land, and unfavorable season, not one total failure is recorded; nor has a single individual uttered complaint to the Reclamation Service.

Especially interesting to me are the experiences of those who came to this new country without any previous knowledge of farming. Their successes may well lead us to believe that new avenues of hope are opening to the careworn and discouraged who are living miserably in our crowded cities.

THE MAKING OF PROSPEROUS HOMES

A few years ago a young man, raised on a Pennsylvania farm, came to Washington, D. C., and was enrolled as a stenographer in the Post Office Department. About three years ago he took stock, as it were, and decided that a clerical profession did not suit him. He concluded to improve his annual leave by taking a western trip, and stopped off at Billings, Montana. He was attracted strongly by this progressive young city, and decided to remain. When the Huntley lands were opened, and he took a chance, fortune favored him and he drew a farm of 47 acres, all irrigable. A part of the $1,500, which represented his savings as a government clerk, he paid out at once for the erection of a neat cottage; the sum of $176 was paid for his first installment of water right. A year ago last month the home was ready, and after resigning his job he sent for his family and moved in. He cleared 35 acres of sage-brush, plowed and leveled it, and sowed 24 acres to oats and 4 acres to wheat. He set out 250 apple trees, and between the rows planted 4,000 strawberry plants, potatoes, currants, grapes, strawberries, and blackberries. About the house he set out quick-growing cottonwoods and many junipers. The housewife, meanwhile, did not forget a small flower garden, nor neglect a lot of

* See "Winning the West," February, 1906; "Millions for Moisture," April, 1907; "Homemaking by the Government," April, 1908, NAT. GEOG. MAG.



GATES IN THE MAIN CANAL OF THE TRUCKEE-CARSON PROJECT, NEVADA
(SEE PAGE 427)

A PORTION OF THE CONCRETE-LINED MAIN CANAL OF THE KLAMATH PROJECT, OREGON (SEE PAGE 417)

BUILDING THE HIGHEST MASONRY DAM IN THE WORLD: SHOSHONE DAM, WYOMING

The dam will be of concrete gravity type, 328.4 feet from bed-rock to top of parapet walls; 85 feet long on the bottom; 200 feet long on the top; 108 feet thick on the bottom. It will create a reservoir covering 6,600 acres, with a capacity of 456,000 acre-feet. Water will be used to irrigate about 150,000 acres of land lying 75 miles east of the Yellowstone National Park (see page 411).

fancy chickens. On the first of November he took an inventory for me and reported oats yielding 62 bushels and wheat 30 bushels per acre. Potatoes and other vegetables proved a good crop and furnished enough to carry him through the winter. The apple trees are flourishing, and the outlook for small fruit is most encouraging for 1909. This spring he will plant 30 acres in sugar beets, and he says he can net from $50 to $80 per acre.

Growing tired of the dangerous profession of locomotive engineer, Elmer Eiker resigned and took up a farm at Huntley, where he moved his family, consisting of a wife and three daughters. His capital was about $1,000. He only cleared and cultivated 20 acres, planting an assortment of wheat, oats, sweet corn, potatoes, onions, squash, sugar beets, watermelons, cantaloupes, and other vegetables. It was such a variety that I accused him of making a raid on some Congressman's seed appropriation. Rather remarkable to relate, he was successful with nearly everything he put in the ground. His oats threshed over 45 bushels; wheat, late planted, 18 bushels; potatoes, 150 bushels; onions, 300 bushels per acre; from one-eighth of an acre in cucumbers he sold more than $50 worth. Everything was grown on new land never before touched by a plow. Mr Eiker says any man with three horses, a cow, a few chickens, and $500 in cash, combined with industry and common sense, can make good on one of these 40-acre farms. Several hundred farmers, his neighbors, are doing it. The Huntley project now contains 300 new homes. Its towns are growing. There are eight graded or centralized country schools, four church organizations, and a bank with $50,000 in deposits. Two years ago this country was a sage-brush desert and uninhabited. Last year the first crop was irrigated by water from the new canal system.

THE SHOSHONE PROJECT, WYOMING

Under the protecting shadows of a lofty mountain range in northern Wyoming there is a broad and fertile valley through which flows a strange and wonderful river. In prehistoric days immense geysers along the stream sent their boiling waters high into the air. In the river bed and on the banks great hot springs burst forth, the waters possessing qualities of healing and odors far-reaching. The Indians, who oft renewed their youth in them, called the stream Shoshone, or "stinking water"—an unfair cognomen—for, save at the spring, the river is as clear as a mountain brook and its waters are good to drink.

Unnumbered ages ago there was a beautiful lake, a few miles above the valley, fed by countless streams flowing down from snowy peaks. Between it and the valley a range of lofty mountains intervened. When the lake topped its banks the overflow, passing through some cleft or crevice in the mountain range, during centuries of time gradually chiseled out a canyon eight miles long and hundreds of feet in depth. When the bottom of the canyon was cut below that of the lake, its waters poured out and passed through the gorge and the lake bed was exposed. The entrance of that gorge is only 60 feet wide on the bottom; 300 feet above it is only 200 feet wide. No irrigation engineer could view it without wishing to lock it with a dam. It has been waiting all these years for some one daring enough and with capital enough to block it up and restore once more the beautiful lake that disappeared so long ago.

A BLOCK OF CONCRETE SEVERAL HUNDRED FEET HIGH

In 1910 the lake will reappear, and on its shores countless wild fowl will build their nests. From the depths of the shadowy canyon the world's highest masonry dam is slowly rising, a solid block of concrete, locking securely the perpendicular cliffs of granite and thrusting back the angry floods of the turbulent and torrential river. The work is impressive; it is also attended by many dangers and calls for courage and daring on the part of the men engaged upon it. The scenery is magnificent, the canyon justly ranking with other famous gorges

of the West. The drive over the highway constructed by the Service is one never to be forgotten. As the future route to a new entrance to Yellowstone Park, it will doubtless attract thousands of tourists. The great dam is for storage and for power development. It will hold back flood waters heretofore wasted until needed for irrigation in the summer.

Down the river another dam, a low structure of concrete, diverts the stream into a tunnel 3¼ miles long. This tunnel, passing through the bluffs on the river's edge, emerges at the head of the valley and the waters are carried into a broad canal and thence to the farm lands. Last spring an opening occurred here and 17,000 acres were offered to settlers. Practically all of the farms are taken and many of the newcomers have harvested a crop already. In all my experience in the West I do not recall a more rapid transformation from brown desert to green fields than I saw here last summer. The swiftness with which things grew on this desert soil was positively startling. More than 100 families are now established here and, as on the Huntley, there are no complaints. A second unit of this project, consisting of 13,000 acres, will be made ready for settlers in time for spring planting. At the same time a portion of the lots in the government townsite of Powell will be sold at auction, affording many opportunities for merchants, mechanics, and men of other professions. "The best country I ever lived in" is a common expression on this project.

SUN RIVER PROJECT, MONTANA

To the man who is accustomed to the climate of New England or our Northern States, the attractions and advantages of the Sun River country, near Great Falls, Montana, should appeal strongly. Especially is this true if he be inclined to engage in general farming and raising live stock. The farms on this project are 80 acres of irrigable land, for which the settler must pay for water at the rate of $30 per acre, payable in annual installments, not to exceed ten, without interest. He is also allowed to file on 80 acres of non-irrigable land, for which he pays only the usual filing fee—about $16. The unirrigated land can be utilized for pasture, corrals, and buildings. Back of the irrigated lands is a vast area of free range covered with nutritious grass in the summer and furnishing forage for vast flocks and herds which in the winter consume the crops grown by irrigation. Owing to the fact that the project is at present some miles from a railroad, settlement has been slower here than elsewhere. The time is not far distant when a new railroad will be extended into the valley, and it is expected that settlement will then be more rapid.

LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA

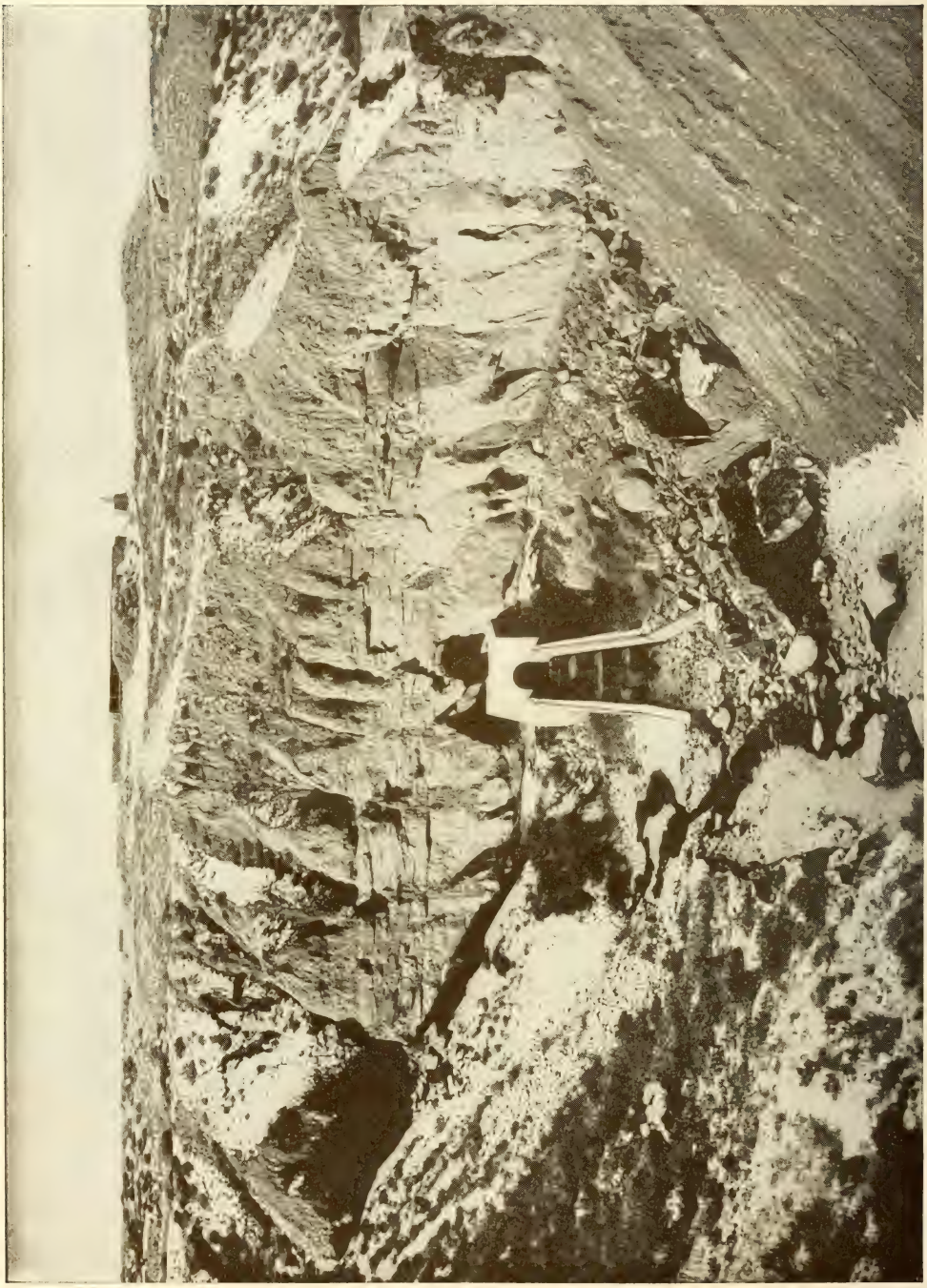
A short time ago the Lower Yellowstone project, embracing 66,000 acres in Montana-North Dakota, was formally opened. A large part of the land is already filed upon. Owing to the very favorable season, many settlers raised good crops of grain last year without irrigation. As a rule they have all prospered, and the outlook for this section of the Yellowstone Valley may be regarded as propitious.

Among the first settlers on the government land on this project was a tall, rawboned young man, a wood-polisher from Buffalo, New York, who filed on 160 acres near Sidney. He landed with exactly $50 in his pocket. Securing employment as a teamster, he saved his salary until he bought a team and wagon of his own, and then secured a contract for hauling supplies. He has now nine good horses and two wagons. On his farm he has erected a good house, has fenced his land, and will henceforth devote his time to harvesting bountiful crops. He has done all this within three years.

OTHER MONTANA PROJECTS

Montana, owing to its very large areas of public domain and its splendid water supply, is a most inviting field for the engineer. The early opening of three

RELICS OF OLD ARIZONA: THE APACHE AND THE CACTUS (SEE PAGE 426)



LOWER PORTAL CORBETT TUNNEL: SHOSHONE PROJECT, WYOMING

This tunnel is 3¼ miles in length, has a cross-section of 10 x 10, and a capacity of 450,000 gallons per minute

Indian reservations will make available for development a hundred thousand acres of choice land in the future.

On the Milk River project, in this state, the government is at work on a large dam at Dodson, while the farmers themselves have undertaken and are successfully building the largest irrigation canal in the United States. On the Saint Marys project, the water supply of which has been made the subject of a treaty not yet ratified, the work of canal building is being done largely by Indian labor. The Indians will be employed to build their own ditches on the Flathead and Fort Peck reservations as soon as plans are decided upon.

Preliminary surveys have been made on this project and an irrigation system designed to supply 130,000 acres of land on the Flathead Indian reservation, in Flathead, Sanders, and Missoula counties. Work will be carried on during the season of 1909 on four units—the Jocko unit covering 6,000 acres; the Mission, 4,500 acres; the Polson, 3,000, and the Mud Creek, 6,000 acres. The Indian allotments amount to 80 acres of irrigable land for each individual. The lands remaining after all the allotments are made will be opened to the public after due notice has been given by the Secretary of the Interior through the public press.

The lands lie about 2,800 feet above sea level, and the temperature ranges from 20° below to 100° above zero. The soil is clay, forest loam, and gravelly loam, and the products are alfalfa, grain, vegetables, apples, and small fruits. The project is located between the Great Northern and the Northern Pacific railroads.

THE NATIONAL IRRIGATION PROJECTS OF WASHINGTON

In the minds of most Easterners the northwest boundaries of our country are usually associated with blizzards and a temperature that puts the average thermometer out of business. There are places along the border where the winds blow and 50 degrees below zero is not uncommon. Again there are places where the seasons are so genial, the temperature so favorable, that delicate fruits like apricots and peaches are grown successfully. Close to the Canadian line, in Washington, is a remarkable valley, shut in by sheltering hills and mountains and favored with the kindly Chinook winds. It is known as the Okanogan Valley, sometimes called the California of the Northwest.

It richly deserves the name, for it is the boast of its early settlers that no killing frost has ever destroyed the orchards in that valley. The reclamation project here is the most expensive per acre of any of those now in process of construction. So abundant are the yields and so profitable and varied are the crops that the land-owners very cheerfully entered into a contract with the government to pay a charge of $65 per acre for a water right. The assurance of a constant and sufficient supply of water for irrigation has increased land values tremendously. Prices here to the Easterner seem very high until the earning capacity of the lands is demonstrated. The Okanogan Valley sent an exhibit of fruits to the Industrial Fair at Spokane last fall. Out of 23 plate exhibits the county drew 19 prizes.

Eight years ago James O'Herin, a shrewd Yankee from Portland, Maine, came to the valley seeking a home. He had $500, and filed upon a homestead which he commuted, and in 1905 sold it for $10,000. This sum he immediately invested in another ranch, which in three years' time he has so improved as to be worth more than $20,000. From a tenant farmer in the East to a land-owner worth $20,000 in eight years may be taken to indicate the possibilities which await the industrious and intelligent home-seeker in the arid West.

IN THE VALE OF PLENTY

Southward and near the line dividing Oregon and Washington is the great Yakima Valley, beyond question the most widely advertised and best known agricultural region in the Northwest. It is

Washington's vale of plenty. The fame of its prodigious crops, the excellence of its fruits, and the general prosperity of all of its people are subjects of fascinating interest. The valley may be said to have been absorbed by the Service, which in the interest of economy has acquired the principal irrigation system and controls the entire flood flow of the stream. The plans provide for a gradual and comprehensive development of several hundred thousand acres of land of unequaled richness. The work is now centered upon two units—the Tieton and Sunnyside—but in the near future the Wapato unit, embracing the Yakima Indian lands, will be opened to settlement.

At the risk of losing my reputation for veracity I wish to mention a few of the numerous instances of success on the part of horticulturists in that valley.

J. O. Shadbolt, for ten years a dry-goods merchant of Virginia, Minnesota, came to Wapato, Washington, in February, 1906, and bought 41 acres, all in bearing orchard, including apples, peaches, pears, plums, apricots, and cherries. He paid $18,500 for the place, or a little over $450 per acre, a price which his friends declared was evidence that he was crazy. He added $2,500 for improvements, making an initial investment of $21,000. In 1908 Mr Shadbolt refused a definite offer of $50,000 for his ranch. Let us briefly analyze the crops produced in the three years he has owned the ranch. In 1906 his sales were as follows:

6,933 boxes Bartlett pears	$6,612.00
2,652 boxes Crawford peaches	1,326.00
8,743 boxes Elbuta peaches	5,245.80
Over-ripe pears sold at home	250.00
4,243 boxes plums, apples, apricots, and cherries	3,023.72
Total	$16,457.52

Deducting operating expenses, about 25 per cent, left a net profit of $12,000.

In 1907 the orchard yielded gross, $29,485.47, and net, $20,500.

In 1908 the business depression affected the market and prices were lower; nevertheless the orchard netted $7,500. In the three years former shopkeeper Shadbolt, who never before had any knowledge of fruit-raising or irrigation, has netted $39,500 on an investment of $21,000, or an average of $13,166 annually. His net income each year has exceeded 62 per cent on his investment. His annual net returns averaged over $321.13 per acre.

Edgar Silvers, from an unirrigated farm near Albion, Nebraska, came to Toppenish six years ago and bought a ten-acre farm under the government canal. He has now 7½ acres in bearing orchard and 2½ acres in young trees. From his matured trees last year and from the vegetables and clover grown between the rows he received $2,727.60 gross. He says this beats 160 acres in the corn belt in net yields, besides being a lot less worry and hard work.

From 9 acres of apples, or 660 trees, A. Larson, of Zillah Post Office, a former citizen of Stockton, Wisconsin, sold $3,755 worth in 1908.

L. I. Barbee, a former resident of Red Oak, Iowa, now living on a 20-acre ranch at Toppenish, sold $2,341.60 worth of apples, pears, plums, and prunes from 357 trees, or more than $6.50 per tree. These trees occupy 6½ acres.

J. C. Milton, also from Red Oak, Iowa, now owner of 6 1-3 acres in apples and peaches, harvested from 300 trees $2,578.55 worth of fruit in 1908, or nearly $8.60 per tree. His average gross return was $407.14 per acre.

Robert McCormick, formerly a lumber-jack at Blue Earth, Minnesota, landed in Zillah ten years ago with just 75 cents in his pocket. For two years he worked as laborer and teamster, and then with his savings made the first payment on 25 acres under the government's canal. It was raw land then, covered with sagebrush. Today it is all in cultivation, and his little farm is bringing him in each year $2,000 above all expenses. Last year he picked 780 boxes of apples from 1¼ acres. He has refused $1.25 per box, or $975 for his crops, which indicates a yield of $780 per acre.

COMMUNAL FARM LIFE IN OREGON

Between the Umatilla River on the west and the Columbia River on the north, in northwestern Oregon, is a broad expanse of sage-brush desert which is now undergoing a remarkable transformation. The irrigation works of the government here consist of a diversion dam in the Umatilla River a few miles above the town of Echo and a storage feed canal, 20 miles in length, carrying the flood flow of the stream into a large reservoir, having a surface area of 1,700 acres and a depth of 70 feet. From the reservoir a series of canals have been extended to embrace about 20,000 acres of exceedingly fine land. The productivity of this section has long been known through the profitable crops under small private ditches. Agricultural experts all agree that this valley has a most promising future. At no distant day we may confidently look for one of the most compact agricultural districts in the state to be established here. The soil is of great depth, the summer comes early, and the growing season is longer than in most parts of the West. The truck and fruit grower can place his crops on the markets in advance of his competitors, and be sure of top prices in the markets of Spokane, Seattle, Tacoma, and Portland, all of which are tributary by rail or water transportation.

An interesting phase of the development here is the combination of urban and rural life; farms are small; many five and ten-acre orchard tracts are being laid out about the towns, and the owners of many of these have built their homes in the towns, so that their wives and children have the advantages of society, schools, and churches.

THE KLAMATH PROJECT

In the land of "Burnt Out Fires"—the region which will long be remembered as the last stronghold of the Modoc Indians—is a remarkable agricultural district known as the Klamath Basin, which lies partly in California and partly in Oregon, and embraces several hundred thousand acres. The first unit of this important national irrigation work is completed, and several thousand acres of fertile land are now receiving water from the government canals. Of all the Federal works, Klamath project is, perhaps, the most unique, by reason of the fact that it involves irrigation and drainage in unusual combination. A considerable portion of the lands to be irrigated is today covered with the waters of navigable lakes; these waters are to be drawn off and the exposed lake beds are then to be subdivided into farms and irrigated by the government canals.

A new railroad has been completed to the valley, and the indications are that this region is to enjoy rapid growth and development. Its advantages in soil, climate, and products, as well as in great undeveloped natural resources—in forests, water power, and free grazing—are certain to attract enterprising citizens from all parts of the country.

IDAHO'S WONDERFUL DEVELOPMENT

The most important stream in the arid West is Snake River, in Idaho. From the foothills of the Tetons, which form the boundaries of Wyoming and Idaho, to the western boundary of the latter state, Snake River traverses a wide lava plain which constitutes the most interesting and important physiographic feature of the southern part of the state. Snake River now irrigates a larger area than any other stream in the United States. Two reclamation projects of the government have been undertaken in this drainage basin, one supplied from the main stream and the other from two important tributaries.

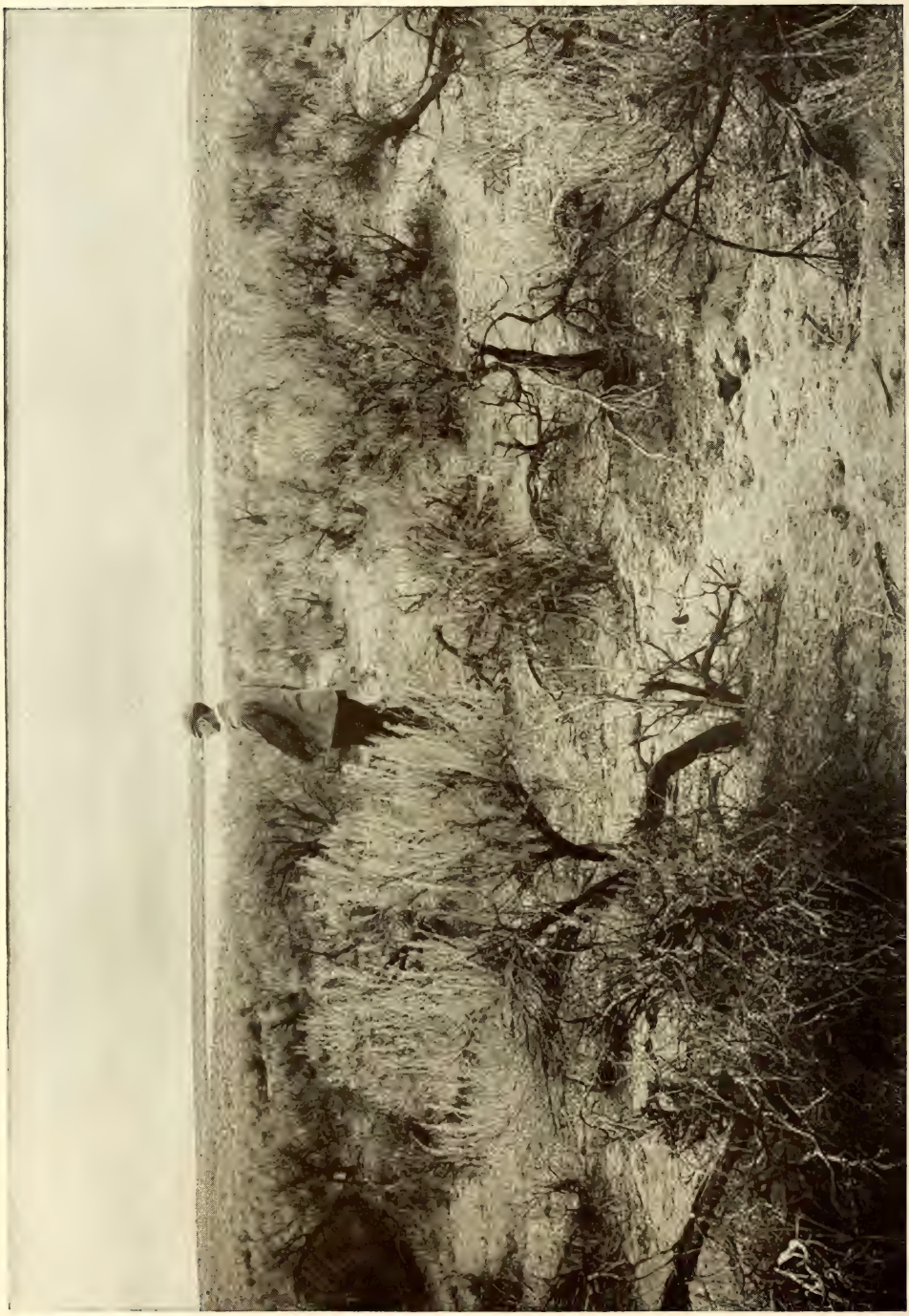
The Minidoka project, in the southern part of the state, was partly completed in 1907, and made available for entry 1,050 farms, varying from 40 to 80 acres each. Before the water was ready every farm was filed upon, and 5,000 people established homes in the sage-brush. The most important feature of construction is the rock-fill dam across the river, a structure 650 feet long on top and 50

THE PATHFINDER DAM OF THE NORTH PLATTE PROJECT (SEE PAGE 427)

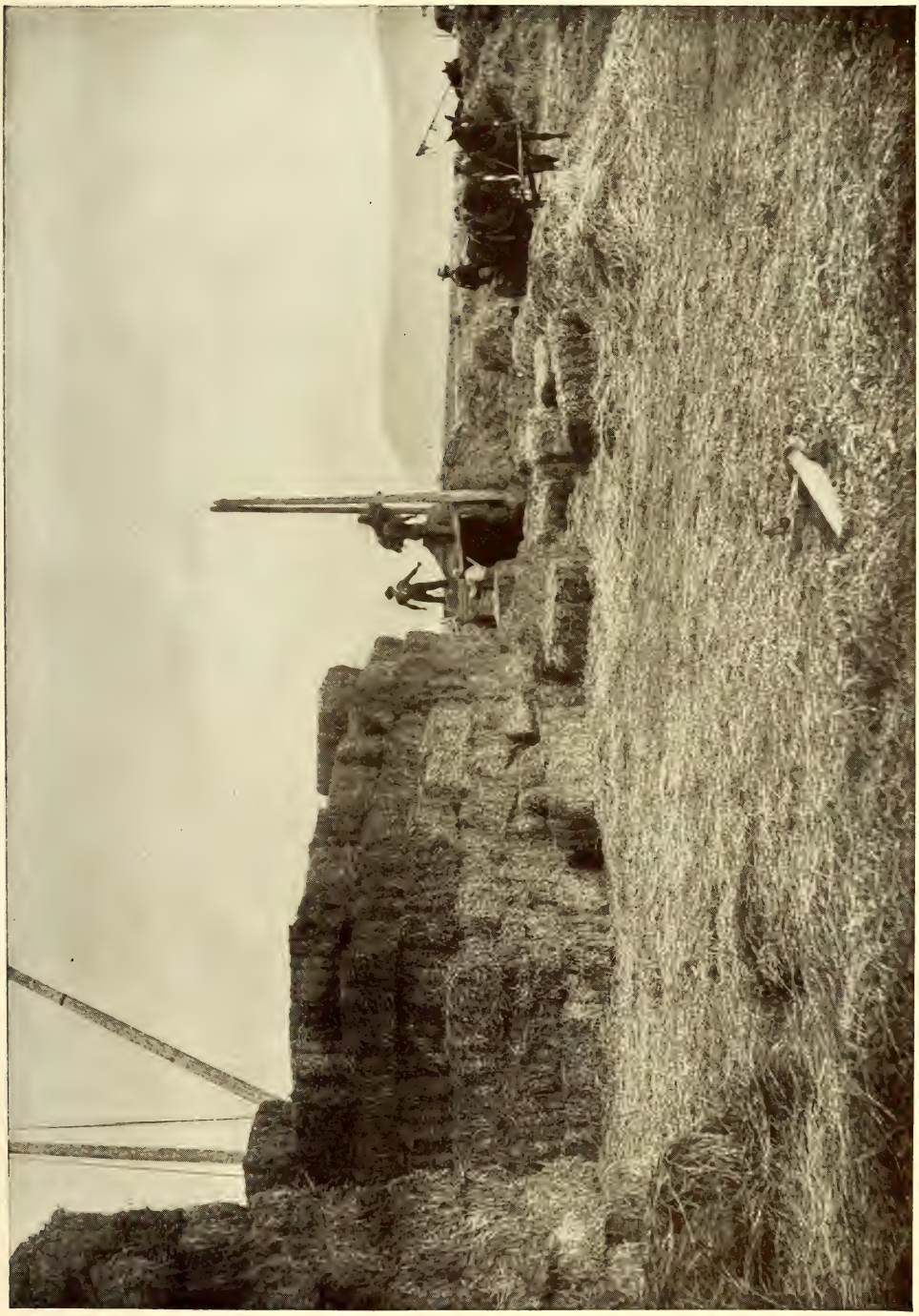
This structure will be 215 feet high and will create an enormous reservoir, with a storage capacity of 1,025,000 acre-feet, or enough water to cover 1,025,000 acres a foot deep. It will be completed May 1, 1909, and will cost $975,000

CLOSING COLORADO RIVER DURING CONSTRUCTION OF LAGUNA DAM, YUMA PROJECT, ARIZONA-CALIFORNIA

Nearly 72,000 cubic yards of material were dumped into the stream before the closure was effected. The Laguna dam now completed is 4,780 feet long, 19 feet high, and weighs 600,000 tons



A STRETCH OF SAGE-BRUSH DESERT BEFORE IT WAS LAID OUT IN FIVE-ACRE TRACTS FOR CULTIVATION: UMATILLA PROJECT, OREGON (SEE PAGE 417)



BALING HAY IN OREGON ON THE FORMER SAGE-BRUSH DESERT

feet high. On each side large canals take the water out upon 130,000 acres of desert land. This section of Idaho has been widely advertised, and contains several of the largest irrigation enterprises ever built by private capital. What was astually an uninhabited sage-brush plain in 1902 now contains probably more than 20,000 people, and its development has only just begun. If the storage supply proves adequate, not less than a million acres of exceptionally fine land will be brought under cultivation, and this one section will then support a population equal to that of the entire state.

Nearly 400,000 acres of fertile land in the valleys of the Payette and Boise rivers, in southwestern Idaho, are embraced in a reclamation project. This is a most attractive region and practically all of the public lands have been taken up. With its advantages of soil, climate, and crops, these valleys will support in comfort a large population. The progress made here in the last three years presages nearly ideal conditions of rural life. Trolley lines and telephones now connect many of the farms with the growing cities. It is possible even now to live in the country 25 miles from the city and enjoy many of the advantages of the latter. On February 22 of this year the people of the valley formally celebrated the opening of the first important unit of this work. In the presence of several thousand people the gates of the big Boise dam were closed and the waters turned into a huge canal. The Boise dam is 400 feet long on top and 45 feet in height. An important feature of this project is the Deerflat reservoir, which was created by building two very large earthen dams inclosing a depression between the hills. One of these dams is 4,000 feet long and 70 feet high; the other 7,200 feet long and 40 feet high. The total quantity of earth and gravel in these dams is 1,088,800 cubic yards. The main canals in this project will have a total length of 400 miles.

IN PROSPEROUS COLORADO

In Colorado, one of the pioneer states in irrigation, the government has nearly completed one large project and is preparing to begin work upon another. The first of these is kown as the Uncompahgre and is located in the western part of the state. In the valley of the Uncompahgre are many thousands of acres of fertile land, easy of access for irrigation canals, wanting only the application of water to produce abundant and valuable crops. Unfortunately this stream is deficient in flow and erratic in regimen. The canal systems in use were often short of water, and crops and valuable orchards frequently suffered from drouth. At a distance sufficiently near to be tantalizing flows the Gunnison with an unfailing supply, little of which can be used in its own valley. The two rivers flow in nearly parallel courses for many miles, separated by ranges of rugged hills 2,000 feet high, forming some of the roughest country in the West. The problem of uniting the waters of these two rivers was often discussed by engineers, but practical plans were never formulated until a daring engineer of the Service, at the peril of his life, made the necessary preliminary surveys.

For many miles in its course the Gunnison rushes through a box canyon, with walls in places 3,000 feet high. A portion of this profound gorge had never been explored until the government engineer accomplished the feat. The preliminary survey, which was made during that wild trip down the river, showed that the elevation of the Gunnison was higher than that of the Uncompahgre, and proved the feasibility of transferring some of the waters of that stream by means of a tunnel passing under the mountain. It was a stupendous task, involving an enormous outlay of money and taxing engineering skill and ingenuity to the limit. The work of final survey and location was most perilous, owing to the necessity of making a topographic map of the canyon and estab-

lishing precise levels at both ends of the tunnel. Before construction could be begun a road was built into the canyon so that heavy machinery could be brought in. A town sprang up at the bottom of the rock-walled chasm, a power plant was erected, and after many months of weary labor the drills began to eat into the granite. On the other side of the mountain another town was established and similar work commenced.

The total length of the tunnel will be nearly six miles, of which five and a half miles are now completed. Throughout the entire period of construction the work has been attended with difficulty and danger; gas, cave-ins, and subterranean springs of hot and cold water have interposed obstacles, delaying the work and requiring the utmost care in its prosecution.

The Uncompahgre Valley has been getting ready for the coming of this new water supply in 1910, which will make fruitful 150,000 acres of desert, and which will ultimately become one of the rich agricultural and horticultural districts of this continent.

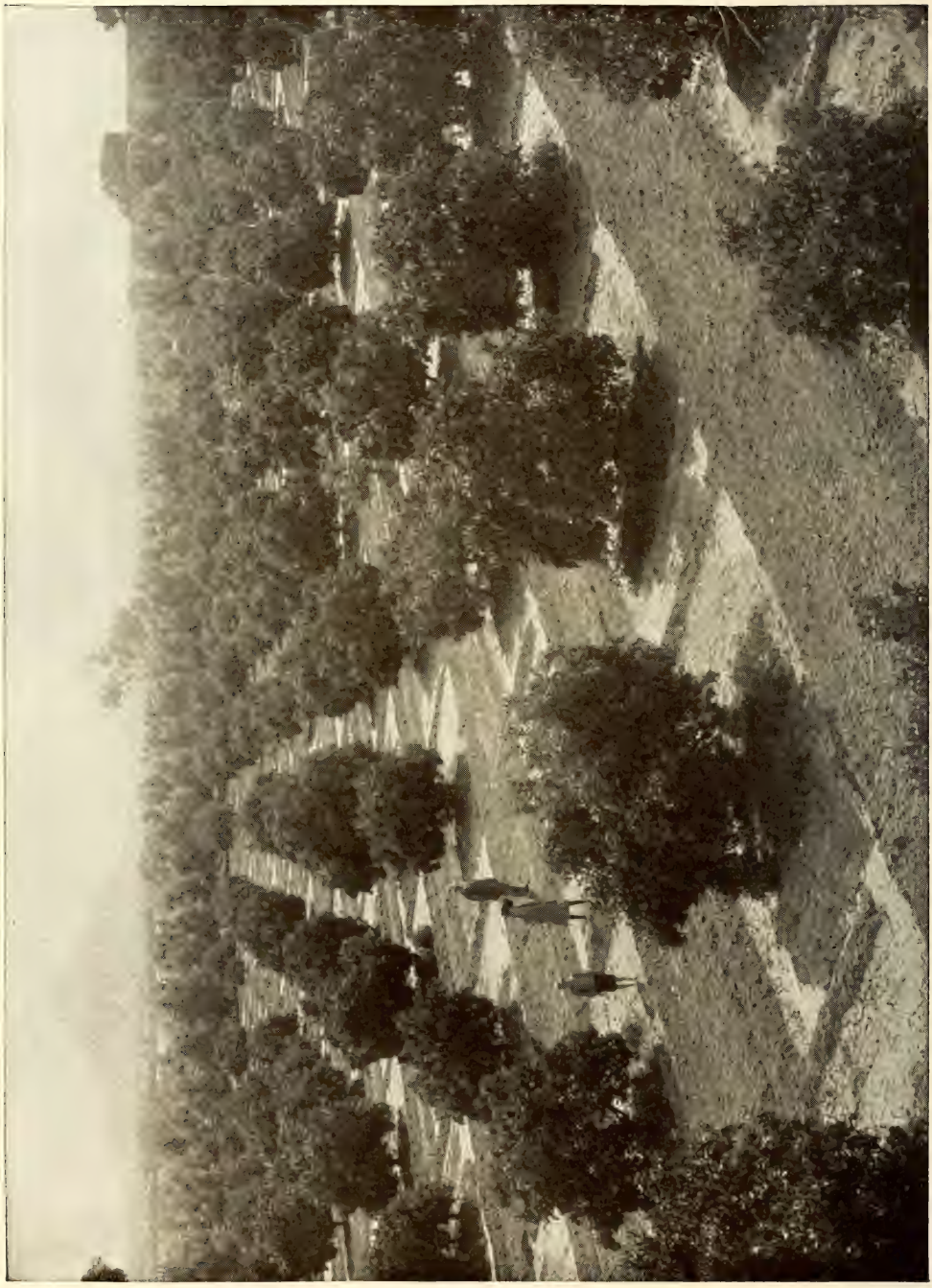
Colorado's second reclamation project is located in the vicinity of Grand Junction and embraces some 50,000 acres of the best land in the famous Grand Valley—one of the most favorably situated agricultural valleys in the world. This is a region where scientific fruit-growing is the rule and not the exception, and as a result of the enterprise and intelligence of its farmers fruit lands here have a higher value than anywhere else on the globe. The climate, soil, and elevation are alike adapted to the growing of a variety of products which in perfection, color, and flavor are unexcelled. It requires no particular gift of prophecy to foretell that when the works are completed this valley will become one of the nation's show places. The farms will be small in area, making the settlements compact; intensive agriculture will be extended, and large areas in high-priced fruits will be cultivated. With cheap water power right at hand, trolley lines will be extended to all parts of the valley, affording facilities for cheap and ready marketing of all products. There is no reason why farm life will not ultimately become more nearly suburban than rural in character.

The opportunities which exist here for making a farmer's life attractive will not be overlooked. We may confidently look for a citified country. Constant contact and association with his neighbors will bring about coöperation among the farmers both in producing and marketing the farm products.

This is not a picture of fancy; it is not a dream of Utopia; rather is it the inevitable result of intensive and scientific cultivation of small farms, each occupied by its owner and family.

THE COLORADO RIVER AND ITS PROBLEMS

The Colorado River, its watershed and its wonderful delta, have long been subjects of engrossing interest to the engineers of the West. The desert of this river is a distinctive feature in a region full of natural wonders. A large portion of it lies below sea level, and in recent geologic period was the bed of the ocean. From earliest time this great stream, rising in the mountain fastnesses of distant Wyoming, Colorado, and Utah, has been carving out a canyon through an elevated plateau more than a mile deep in places and unrivaled anywhere in the world in scenic grandeur. During countless ages the Colorado has been grinding to powder incalculable quantities of rock and soil, building up a broad valley with sedimentary deposits, and elevating its bed above the level of the desert through which it flows. As a whole, the Colorado River probably offers the most interesting as well as the most stupendous engineering problem which exists in arid America today. Solve it successfully, and a million acres of desert in this country and half a million acres in Mexico will furnish homes for more than a million people. No power save that of the Federal government can cope successfully with this problem. Mexico will doubtless be willing to share her proportionate part in the expense of storage



IRRIGATED ORANGE GROVES IN THE SALT RIVER VALLEY, NEAR PHOENIX, ARIZONA (SEE PAGE 425)

for water to be utilized on lands belonging to that Republic. The problem involves interstate as well as international features, and will require the expenditure of a sum of money great enough to make the work comparable with the largest schemes for irrigation attempted by England in Egypt or India. From its headwaters in Utah, Wyoming, Colorado, and Arizona to the rainless delta, the river must be absolutely controlled. Enormous reservoirs must be created by building dams in the mountain regions to store the floods, and hundreds of miles of canals must be laid out to carry the water upon a sleeping empire.

The Colorado desert is a region unique and wonderful. Potentially, it is greater than any area of its size in the world. The fertility of its soil, its climatic adaptability to unusual crops as well as many staples, make it one of absorbing interest to the agricultural scientists. The first important step has been taken by our government for the subjugation of the Colorado. A few weeks ago the engineers of the Service, after two years of difficult labor, succeeded in placing a dam across this intractable river. As if resentful of any attempt to check it in its mad course to the Gulf, the Colorado rose in flood to oppose the engineers. The final struggle was of many hours' duration and full of excitement and danger to an army of men who fought bravely for hours against the rising wall of angry waters. The coffer-dams held fast and the Colorado was safely turned at last into the enormous sluiceways on either side. Today a solid wall of stone and concrete 4,780 feet long and 250 feet wide, tied to enduring hills of rock on either end, rests in the channel. Man has again conquered the forces of nature, and a mighty river, never before controlled, is now a servant to his hand. During the present summer 17,000 acres will be opened to settlers on this project, the lands lying in California.

IN AMERICA'S EGYPT

Arizona is America's Egypt, but, unlike the land of the Pharoahs, whose secrets are revealed to us in hieroglyphics which our wise men have learned to read, the history of the ruined cities of our Southwest and the race that built them is yet unfathomed.

This is our land of mystery and enchantment, where nature has painted the landscapes with the rainbow's hues. It is the land of the painted desert, with its inspiring scenery and colors; it is the land of the Grand Canyon, Nature's architectural masterpiece, the Titan of chasms; the land of the meteoric mountain and the petrified forests. With resources of soil, minerals, and forests as varied as the wonderful colors of the landscape; with every gradation of climate from north temperate to semi-tropic; with an area double that of New England and a population less than that of the city of Washington, Arizona is yet practically undeveloped and almost unexplored.

Over its vast expanses of divinely tinted desert wander the Bedouins of the United States. Here and there on the higher mesas, or beside the deeply eroded waterways, dwell the strangest people on our continent.

This land of mystic dreams, of lost races and crumbling ruins, is awakening to the touch of modern civilization. The streams that once swept on unchecked through gorge and canyon are now being spread upon a thirsty land, and emerald-tinted oases are dotting landscapes which for ages were barren and desolate.

After the long and dusty ride across Arizona the traveler who awakes in Phœnix in the early morning feels transported into a new world. He is in a land where vegetation is almost tropic in its splendor and luxuriance. Here are avenues of palms whose spreading branches bend in graceful curves. Here the orange, the lemon, the olive, and the pomelo attain perfection in color and flavor. The date palm, laden with luscious fruit, the bread of the desert; the delicious fig, the almond, and countless other donations of generous nature are seen on every hand. Broad fields of alfalfa, yielding eight tons to the acre; bumper yields of grain, veg-

etables, and small fruit reward the man with the hoe in this land of sunshine and plenty. The soil's response to tillage and moisture is immediate—yea, almost miraculous.

But earth grants no harvest here without labor and expense. The desert, vast and forbidding, is near and threatening. Its threat of desolation is vitalizing; it energizes the man who engages in the combat. It thrusts its boundaries to the very edge of the irrigation canal which embraces the oasis. More than once in early days, when the river failed, the desert swept across the ditch and engulfed the fields and orchards. Such disasters emphasized the need for an assured water supply and led to the initiation of one of the most stupendous irrigation projects of our time in Salt River Valley.

THE MOST DIFFICULT OF ALL PROJECTS

In the variety of the engineering problems, in the magnitude of the works, and in the extraordinary character and number of difficulties surmounted in prosecuting the work, the Salt River project ranks first among the works of the Reclamation Service.

A few of these difficulties are made manifest by an inspection of the country in which the work is going on. The Salt River for a number of years furnished an inadequate supply of water for the needs of the farmers. At times great floods destroyed important headworks and caused heavy losses until the necessary repairs could not be made for lack of money. Near the headwaters, in an almost inaccessible mountain region, was one of the best natural reservoir sites in the West. To develop it involved an expenditure so vast that it was beyond the means of the community to attempt it. Congress enacted the Reclamation Law and the Reclamation Service took up the great work.

For 20 miles across a desert of cacti and mesquite, an absolutely waterless plain, a broad highway was laid out to the foot of the mountains. For 40 miles further into the most rugged mountain country in the West the road was blasted from the rocks.

In scenic beauty and in artistic and changeful coloring no highway in the West compares with it. The mountains are inspiring and the rocks are clothed in richest colors. No language can describe the glories of the sunrise or sunset pictures on those crags and cliffs, or the witching beauty of the deep canyons veiled in purple shadows. It is a drive, once taken, never to be forgotten.

The entrance to the canyon which Salt River has cut through the mountains was selected as the site of a dam. This structure in many respects will be one of the great engineering works of the age. At its base it covers an acre of ground. It will rise 284 feet from foundation to parapet and on top it will be 1,080 feet in length. To erect such a structure in a region so remote from transportation involved many difficulties. It was necessary for the engineers to qualify in many capacities. The government developed its own power by constructing a power dam 19 miles up the river and turning the water into a canal which was lined for miles with cement. A drop of 220 feet above the big dam furnished 4,000 horse-power, which was utilized for many purposes.

The engineers operated a cement mill which has turned out to date more than 100,000 barrels of first-class cement. Saw-mills were set up in the national forest, 30 miles away, and several million feet of lumber were cut and hauled to the works. Two farms were cultivated to supply forage and provisions, hogs and beef. Water works and electric light plants were established. A city of 2,000 people sprang up in the valley—a town of transient renown, for it has already nearly disappeared. For laborers the government turned to the Indians living in the mountains. Though many of them were Apaches, they proved tractable and industrious, and it was largely by their labor that the remarkable highway was constructed. From the big dam and from drops in the canal 26,000 horse-power will be developed. A part of it will be transmitted to the Sacaton Indian reservation to pump water from wells upon 8,000 acres belonging to the Pima In-

dians—an act of justice long postponed, for the tribe was beggared by the robbery of their water supply by white men.

ORLAND PROJECT, CALIFORNIA

This project involves the reclamation of 12,000 acres of land lying about 90 miles north of Sacramento, in Glenn and Tehama counties. The only town within the territory to be irrigated is Orland, on the Southern Pacific Railroad. The lands are exceedingly fertile, and for many years have been cultivated and utilized for wheat growing. With irrigation and the prevailing climatic conditions, however, it has been demonstrated that the land is unequaled for the production of alfalfa, nuts, and both citrus and deciduous fruits. Preliminary work on this project is practically completed, and advertisement for bids for building the East Park dam and spillway will be made in the near future. Many of the farmers are pledged to dispose of their holdings in excess of 160 acres to those who wish to take them under the reclamation project.

GARDEN CITY PROJECT, KANSAS

This project consists of a pumping system for the recovery of underground waters, which are delivered into a conduit leading to an old distributing canal, known as the Farmers' Ditch. The plant consists of twenty-three pumping stations, each driven electrically from a central power station. There are 10,656 acres of irrigable land in the project, lying in the vicinity of Garden City, on the north side of Arkansas River, townships 22 to 24 south, ranges 32 to 35 west, sixth principal meridian, Finney County.

The lands are all in private ownership, but there are some excess holdings for sale. The soil is a rich prairie loam, capable of the highest cultivation, and well adapted to the raising of grain, sugar beets, cantaloupes, alfalfa, and other crops of the plains region. The average elevation of the area under this project is 2,925 feet above sea level, and the temperature ranges from 20° below to 105° above zero. The Atchison, Topeka, and Santa Fé Railway furnishes transportation for the products to the local markets and to Chicago and Kansas City. The water-right charge is $35 per acre of irrigable land, and the farmers are also required to pay an annual maintenance and operation fee, which at present amounts to $2.75 per acre.

NORTH PLATTE PROJECT, NEBRASKA-WYOMING

This project is located about 100 miles north of Cheyenne, Wyoming, and extends along the North Platte River. About 60,000 acres of land, practically all of which has been filed upon, will be supplied with water in 1909. The land is tributary to the Chicago and Northwestern, Burlington and Missouri River, and Union Pacific railroads. The average elevation is 4,100 feet above sea-level, and the temperature ranges from 25° below to 100° above zero. The average annual rainfall on the irrigable area is about 15 inches.

The soil is a fertile, sandy loam, quite free from alkali, and requiring 2½ acre-feet of water per acre per annum. Alfalfa is the principal crop, but cereals, sugar beets, and potatoes are successfully grown. Excellent range country borders the irrigable lands in Wyoming.

The farm unit has been fixed at 80 acres, and the building charge is $45 per acre. There is also an annual charge for operation and maintenance, which is 40 cents per acre at present. The watershed area is 12,000 square miles, and the estimated annual run-off of watershed at Pathfinder dam is 1,500,000 acre-feet.

TRUCKEE-CARSON PROJECT, NEVADA

This project is located in western Nevada, in Churchill, Lyon, and Storey counties, townships 16 to 24 north, ranges 21 to 31 east, Mount Diablo meridian. The first unit of the project was opened in 1907, and lands are now subject to homestead entry. In addition to the land-office filing fee, each settler is required to pay $3 per acre annually for

PUMPKINS IN AN ORCHARD: YAKIMA PROJECT, WASHINGTON (SEE PAGE 416)

SCENE ON A TURKEY FARM ON THE GARDEN CITY PROJECT, KANSAS (SEE PAGE 427)

A MILLET FIELD ON THE TRUCKEE-CARSON PROJECT, IN NEVADA (SEE PAGE 431)

ten years, without interest on deferred payments. An annual maintenance fee is charged in addition. The first payment of $3.60 per acre must be paid at the time of filing on the land; the farm unit is 80 acres.

The climate in this valley is healthful and mild, the elevation above sealevel is about 4,000 feet, and the temperature ranges from 12° below to 112° above zero. It is so dry, however, that the extremes, which seldom occur, are not severe. The average rainfall on the irrigable area is 4 inches per annum. The soil is sandy loam, clay loam, and volcanic ash, requiring 3 acre-feet of water per annum for each acre. The valley will produce every variety of crop grown in the north temperate zone; alfalfa, wheat, barley, and oats grow luxuriantly, and corn is also a profitable crop. Apples, pears, peaches, apricots, cherries, potatoes, and garden vegetables do well and find a ready market in the near-by mining towns. The Southern Pacific and Nevada and California railroads traverse the tract and furnish transportation to the markets of the country.

RIO GRANDE PROJECT, NEW MEXICO-TEXAS

This project contemplates the reclamation of 180,000 acres of land, 110,000 of which are in New Mexico, 45,000 in Texas, and 25,000 in Mexico.

The Leasburg dam, for the first unit of the Rio Grande project, is completed, diverting water for 20,000 acres in Mesilla Valley. It is of concrete, 600-feet long, with sluice and head gates. From the diversion dam 6 miles of canal were constructed to connect with the old Las Cruces Canal.

The Engle dam, which is planned to be constructed across the Rio Grande opposite Engle, will be of rubble concrete, gravity type, 255 feet high, 1,150 feet long on top, and will create a reservoir 200 feet deep at its lower end and 45 miles long, with a storage capacity of 2,000,000 acre-feet. Work has commenced at the dam site and will be prosecuted as rapidly as the state of the reclamation fund will permit. The valley has good railroad facilities, and contains many thriving towns, of which El Paso, Texas, is the metropolis.

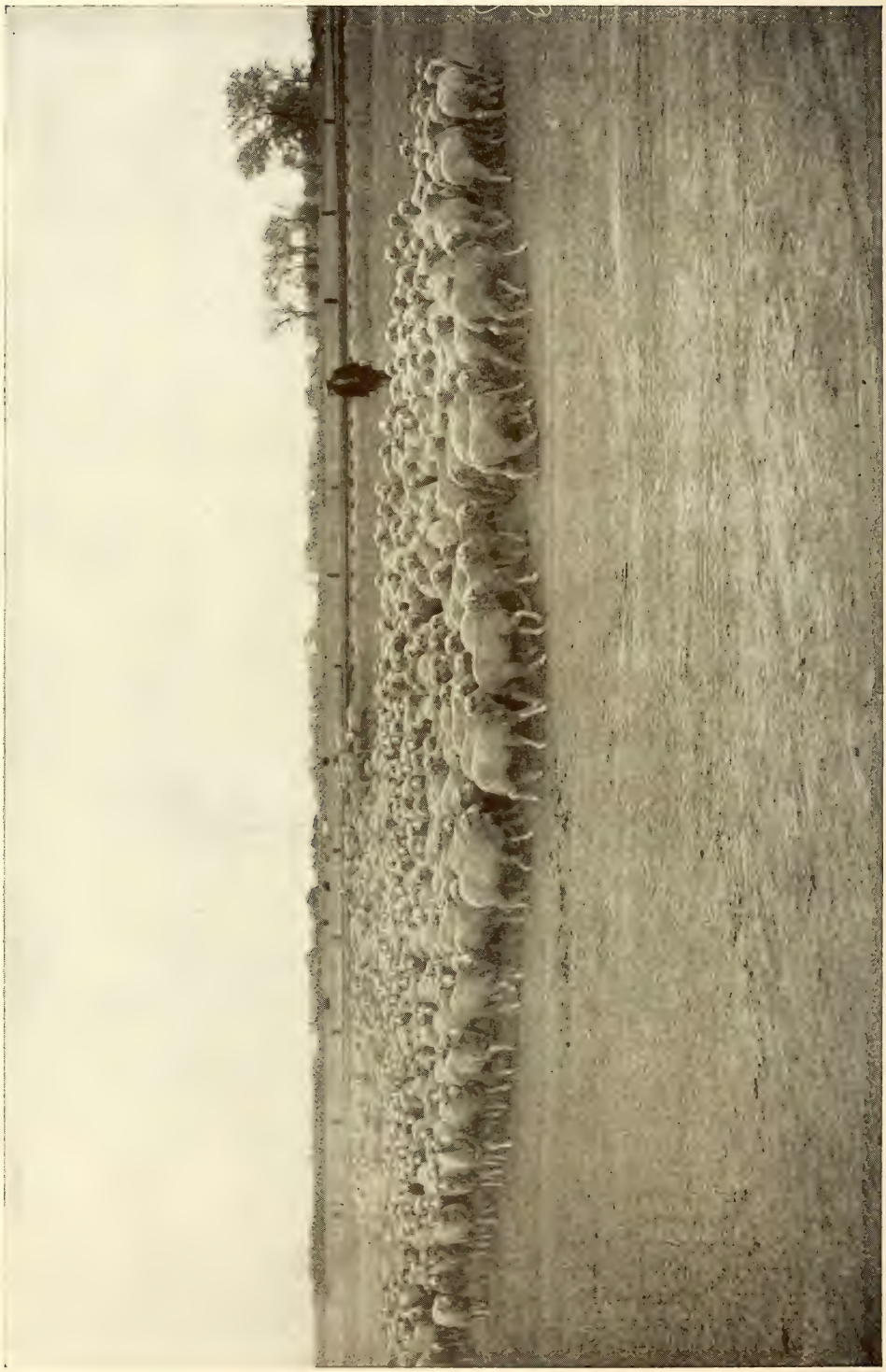
The general elevation is 3,850 feet above sea level, and the temperature ranges from zero to 110° above. The average annual rainfall on the irrigable area is 9.5 inches. The soil is a fertile alluvium, requiring 2½ acre-feet of water per acre per annum. It produces abundant crops when sufficient water is applied, the principal products being alfalfa, corn, fruit, vegetables, and melons.

CARLSBAD PROJECT, NEW MEXICO

The principal works under the Carlsbad project include the reconstruction of canals and storage reservoirs on Pecos River, in Eddy County, which were built to irrigate about 20,000 acres of land. These lands are all in private ownership, but several thousand acres are included in excess holdings and may be purchased. The price of these lands varies from $20 to $60 per acre. The cost of water right is $31 per acre, payable in ten annual installments, and the annual maintenance and operation fee is 75 cents per acre.

The general elevation is 3,100 feet above sea level, and the temperature ranges from zero to 110° above. The soil is a light, sandy alluvium and very fertile. The principal crops in the valley are peaches, pears, apples, cherries, small fruits, alfalfa, cotton, sweet potatoes, celery, and garden truck. Fodder, corn, cane, and milo maize produce good crops. Stock-raising is very profitable, owing to the extensive range lands on the east and west. The Santa Fé Railway furnishes transportation facilities to near-by markets and to Denver and Chicago.

The watershed area is 22,000 square miles, the average annual rainfall on watershed area is 15 inches, and the estimated annual run-off, 150,000 acre-feet. The average annual rainfall on the irrigable area is 14 inches. The system is practically completed.



SHEEP ON THE TRUCKEE-CARSON PROJECT OF NEVADA, WHERE WAS DESERT COUNTRY BEFORE THE GOVERNMENT ENGINEERS CAME
(SEE PAGE 427)

HONDO PROJECT, NEW MEXICO

The Hondo project provides for the diversion and storage of the flood waters from Hondo River, a tributary of the Pecos, to irrigate 10,000 acres of land in Chaves County, near Roswell. The lands are all in private ownership, but excess holdings may be purchased at reasonable prices. The general elevation is 3,900 feet above sea level, and the temperature ranges from 10° below to 100° above zero. The soil is a fertile alluvium and requires 2½ acre-feet of water per acre per annum. Alfalfa, corn, fruits, and vegetables produce abundantly when properly watered. The Santa Fé Railway furnishes transportation facilities. The building charge is $28 per acre.

The watershed area is 1,037 square miles, the average annual rainfall on watershed is 15 inches, and the estimated annual run-off is 40,000 acre-feet.

PUMPING PROJECTS, NORTH DAKOTA

The government has several pumping projects in western North Dakota for the purpose of raising water from the Missouri River to irrigate bench lands which cannot be reached by feasible gravity systems. Steam and electric power are used for pumping, the power being developed from lignite coal, which is found in ample quantities adjacent to the projects. Two of these systems are already in operation, the Williston and the Buford-Trenton.

Williston Project.—The initial unit of this project includes about 8,000 acres of bench and valley lands surrounding Williston, but the system will be enlarged to cover 12,000 acres. The general elevation is 1,900 feet above sea-level; the temperature ranges from 59° below to 107° above zero. The soil of the bottom lands is a heavy clay, with a considerable quantity of alkali. The bench lands, however, are a rich, sandy loam, requiring 2 acre-feet of water per acre per annum. The principal crops grown are wheat, flax, and oats. The supply of oats is always far short of the demand. Alfalfa is profitably grown for winter feed, and sugar beets are likely to become an important crop. Small fruits do well if protected from the winds, and dairy farms and market gardens are needed. The state experiment farm near Williston is of great assistance in demonstrating the value and methods of irrigation to the farmers.

The main line of the Great Northern Railroad passes through Williston, which is the distributing point for this section of the state.

The Buford-Trenton project embraces the bench and bottom lands bordering the north bank of the Missouri River for about 20 miles east of the Montana-North Dakota state line. Power for the pumps on this project is developed at the main power station at Williston, and is transmitted electrically over a transmission line 28 miles long.

The climate and crop conditions are practically the same as those at Williston, and the building, operation, and maintenance charges are the same as under that project. The project embraces about 12,500 acres of bench and bottom lands on the Great Northern Railroad. Practically all the land is in private ownership, but farmers owning more than 160 acres are required to sell their excess holdings, and farms can be bought at from $15 to $25 per acre.

BELLE FOURCHE PROJECT, SOUTH DAKOTA

When completed this project will reclaim about 100,000 acres of land lying north and northeast of the Black Hills, in Butte and Meade counties, South Dakota. The greater part of this land has already been filed on. Water is now available for about 15,000 acres. There is a large amount of land in private ownership which, on account of the ruling limiting the individual water supply to 160 acres, is offered for sale at from $10 to $20 per acre, depending upon improvements and location. The farm unit on public lands is 40 and 80 acres. Settlers are required to pay a building charge of $30 per acre, and an annual fee of 40 cents per acre for operation and maintenance.

The average elevation is 2,800 feet above sea level. The climate is delightful, the temperature ranging from 25° below to 100° above zero. As in other parts of the arid region, the sensible temperature does not vary so much, owing to the dryness of the atmosphere. The soil is clay loam and sandy loam, exceedingly fertile and free from alkali. Fruits, such as apples, cherries, plums, and small fruits, do well, especially on the higher portions of the project near the bluffs, and potatoes can be raised on the south side of the river, where the soil is more sandy. The main crop, however, is alfalfa and native hay, which is in great demand for winter feed, the great number of cattle and sheep summer-pastured on the open range surrounding the project creating a constant demand for alfalfa. All the fruits and vegetables that can be raised on the project can be sold at the mining camps in the Black Hills. The Chicago and Northwestern Railroad passes through the town of Belle Fourche, which is one of the largest live-stock shipping points in the United States.

The engineering work on this project involves the construction of one of the largest earth embankments in the country, which is being built in a depression between two hills. It will be 115 feet high, 20 feet wide on top, and more than a mile long. The reservoir thus created will be filled with water by an inlet canal, which carries the entire flow of the Belle Fourche River.

STRAWBERRY VALLEY PROJECT, UTAH

This project provides for the irrigation of about 60,000 acres of land in Utah and Wasatch counties, on the eastern shore of Utah Lake. The water supply will be obtained from a storage reservoir that is being built in Strawberry Valley, about 30 miles east of the irrigable area. By means of a tunnel four miles long the stored waters will be carried through the mountains and emptied into Spanish Fork, from which a canal 18 to 20 miles long will convey them to the irrigable area. Power created from the high-line canal is now transmitted electrically to the tunnel for drilling and later will be utilized to pump water to lands above the gravity system.

The lands have an elevation of about 4,500 feet, and the temperature ranges from 18° below to 99° above zero. The soil is a sandy loam and gravel, with a deep black soil in the bottom lands, and is exceedingly fertile. Alfalfa, hay, cereals, sugar beets, fruits, and vegetables are grown. Settlers are getting ready to plant orchards as soon as water is available. The lands are all in private ownership, and existing canals are being enlarged to form part of the government system. It is possible to purchase lands at reasonable prices from present owners.

The watershed area is 200 square miles, the annual rainfall on watershed 18 inches, and the estimated annual runoff 65,600 acre-feet. This valley has one of the finest domestic water supplies in the west, artesian water being found at many points.

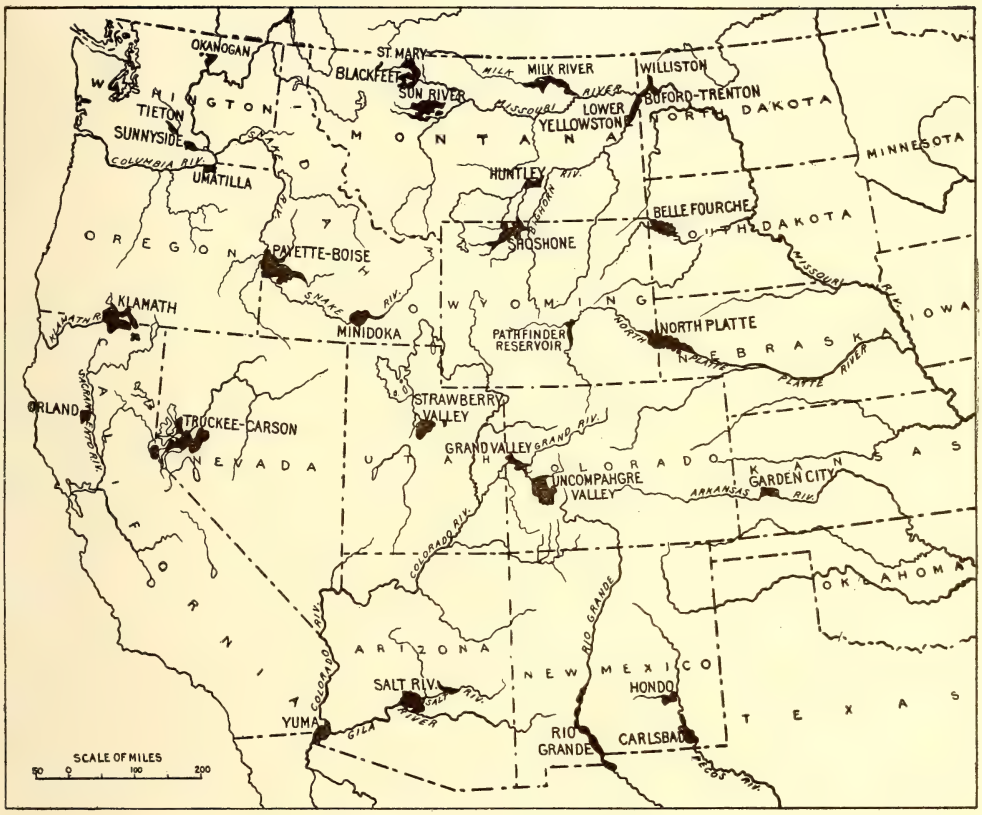
THE DEMOCRACY OF THE DESERT

The democracy of the irrigated sections always impresses the newcomer. It is due to the small farm, the independence of the owners, and the social equality of the people. Conditions compel association and organization in harvesting and marketing high-priced products. The narrow provincialism which has marked life where farms are large is not found here. Rural delivery of mails, with daily papers, the county telephone, traveling libraries, centralized schools, and trolley lines to the towns are all serving to bring the desert farmer within the stimulating currents of the world's thought. One of the most prominent farm editors in America recently said to me: "In the irrigated West there will be developed in time the most nearly ideal conditions of rural life and the best types of men and women the world has ever seen."

A summation of the work of the Reclamation Service up to January 1, 1909, shows that it has built more than 3,458 miles of canals and ditches, some of

K. VAN DER AARDE AND ONE OF HIS WINESAP APPLE TREES: YAKIMA PROJECT, WASHINGTON (SEE PAGE 416)

SEEDLESS SULTANA GRAPES GROWN BY IRRIGATION NEAR CARLSBAD, NEW MEXICO
(SEE PAGE 431)



OUTLINE MAP SHOWING THE LOCATION OF THE GOVERNMENT RECLAMATION PROJECTS

which carry whole rivers. Laid end to end, these canals would reach from New York to San Francisco. It has in operation more than 983 miles of telephone lines. It has built 338 miles of roads, most of which are in a country heretofore inaccessible. The tunnels excavated have a total length of more than 16 miles. Nearly one million acres are now ready for irrigation, embracing 4,686 farms. The construction works completed include 793 bridges and 7,297 canal structures, such as dams, headgates, turnouts, drops, etc.

The excavations of rock and earth moved amount to the enormous total of 54,889,977 cubic yards. It is estimated that as a result of the activities of this bureau more than 20,000 people are now established in homes in the arid West.

CAMPS AND CRUISES OF AN ORNITHOLOGIST

By George Shiras, 3rd

All the illustrations accompanying this article are from photographs by Mr Frank M. Chapman. They are copyrighted by D. Appleton & Co., publishers of "Camps and Cruises of an Ornithologist," from which they are republished by courtesy of Mr Chapman.

WHEN an experienced field naturalist of marked literary ability has mastered all the intricacies of modern photography, we have the best kind of a combination for the production of an attractive and reliable book on natural history. In a recent publication, bearing the above title, Mr Frank M. Chapman, Curator of Birds in the American Museum of Natural History, has embodied in detail his last eight years' ornithological expeditions on the North American continent, covering more than 65,000 miles of travel on land and water, and involving an immense amount of original investigation, aside from the collection of a series of bird photographs heretofore unequaled within the compass of a single volume.*

* Camps and Cruises of an Ornithologist. By Frank M. Chapman. With 250 photographs from nature. D. Appleton & Co., 1909. $3 *net.*

SAND RENDERED IN FEATHERS: A YOUNG BLACK SKIMMER ON COBB'S ISLAND

The hollow where the eggs are laid is not a chance depression, but is made by the bird—the female, so far as was observed—which, squatting close, turns round and round, actually boring out a shallow cavity in the easily yielding sand.

YOUNG FISH HAWKS ABOUT TO LEAVE THEIR NEST: GARDINER'S ISLAND, NEW YORK

YOUNG BLUEJAYS: ENGLEWOOD, NEW JERSEY

PHOTOGRAPHING A FISH HAWK, WHICH WITH ITS MATE HAD NESTED FOR MANY YEARS ON THE ROOF OF THIS "YOKE-HOUSE" ON GARDINER'S ISLAND

A camera was erected some forty feet away, and a rubber tubing, attached to a shutter, led to my hiding place in the basement of the fish hawk's dwelling. It required close attention to detect the sound of the bird's foot-fall on the floor above, but when assured of its return I could stand boldly in the doorway and, with the aid of a bicycle pump, make an exposure at my leisure.

FISH HAWK RETURNING TO ITS NEST ON THE SHORE, PHOTOGRAPHED FROM A BLIND 30 FEET AWAY

BROWN PELICANS ON PELICAN ISLAND, FLORIDA

"With a wing-spread of between seven and eight feet, a pelican is an impressive bird, even at a distance; but when dozens of the broad-pinioned birds swept by me within arm's length I realized that, given the excitable, courageous nature of terns and gulls, the pelicans might dispense with the services of a warden. It is true, a bird which had placed its nest on a stump six feet from my shelter snapped its bill loudly at me when I peered at her through a slit in my blind. The young defend themselves in a similar manner until their wings will bear them, when, like their seniors, they show their faith in the valorous discretion of flight."—FRANK M. CHAPMAN.

THE GROUP OF BROWN PELICANS IN THE AMERICAN MUSEUM OF NATURAL HISTORY, REPRESENTING PELICAN ISLAND, FLORIDA

THE PELICAN YAWN

THE UMBRELLA BLIND IN A MAN-O'-WAR BIRD ROOKERY ON CAY VERDE

See description and photos of this remarkable colony, by George Shiras, 3rd, in June, 1908, NATIONAL GEOGRAPHIC MAGAZINE

BROWN PELICAN FEEDING A YOUNG BIRD LARGER THAN ITSELF

YOUNG BROWN PELICAN AFTER FEEDING

It lays its head on the ground as though it had received a violent blow

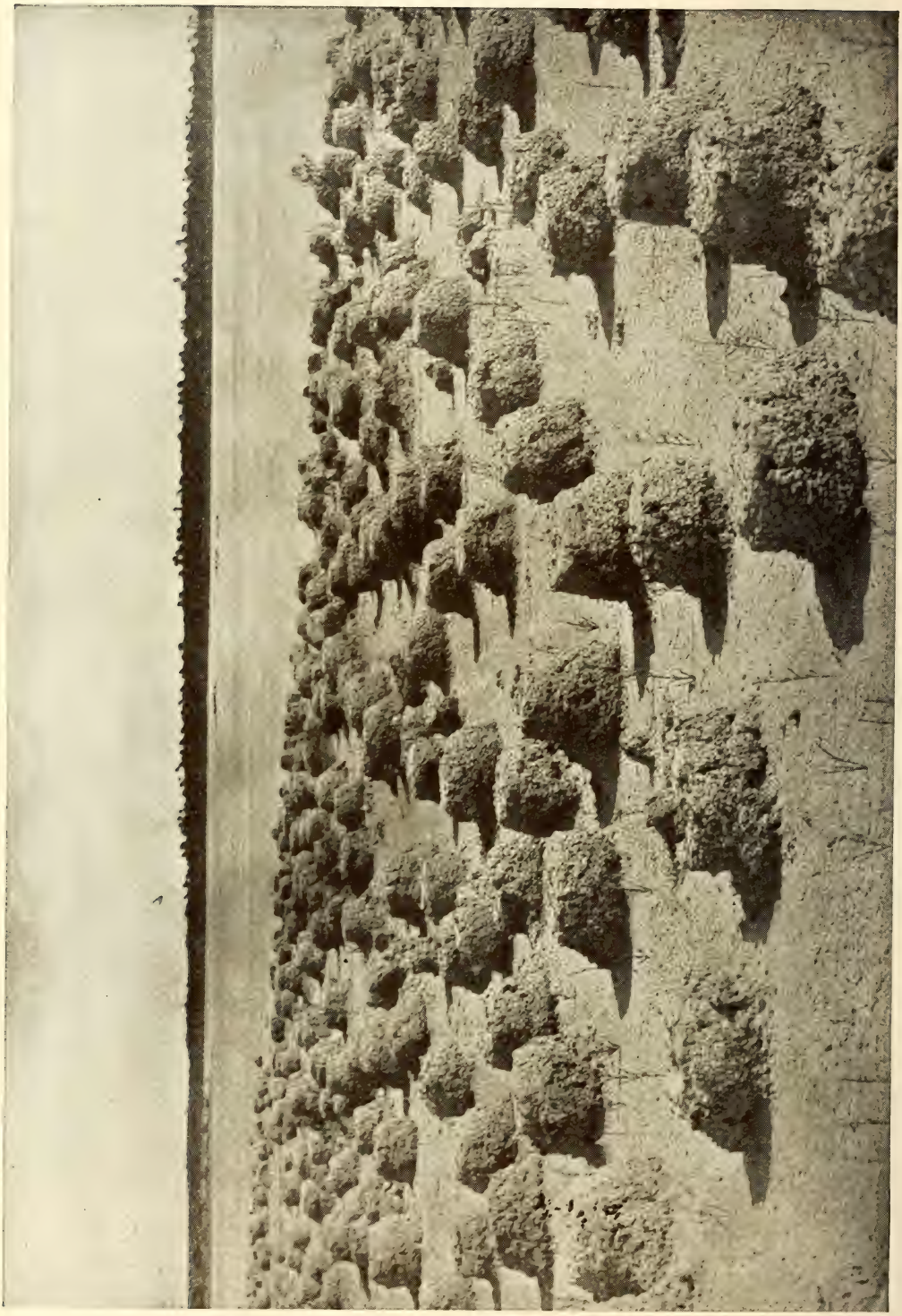
PALMER'S THRASHER AT NEST IN CHOLLA CACTUS: ARIZONA

With the issuance of this book came the opening to public inspection of the completed Habitat Groups of North American Birds at the American Museum of Natural History, in New York. And these two events seem indissolubly connected, for it is beyond the limits of practicability to collect the material for such a book except in coöperation with the field work of some great museum, nor is it possible to appreciate the labors involved in the establishment of these remarkable Habitat Groups without reading the narrative of the many trips made to various portions of our continent in collecting the material.

While it may be true that the high degree of realism and artistic effect of this modern method of taxidermy can only be appreciated by a visit to the museum in question, yet one can get a very fair idea of the beauty of these groups from the half-tone reproductions in Mr Chapman's book, and, on the other hand, a life history of these birds can only be understood and appreciated through Mr

YOUNG FLAMINGOS ABOUT TWO WEEKS OLD: THE BILL SHOWS THE FIRST SIGNS OF CONVEXITY (SEE PAGE 450)

FLAMINGOS RETURNING TO THEIR NESTS



PORTION OF A DESERTED FLAMINGO CITY, CONTAINING ABOUT 2,000 NESTS: THE BAHAMAS

YOUNG FLAMINGOS IN FLOODED NEST

Showing the necessity of raising the nest above the normal water level

Chapman's vivid and interesting descriptions.

After reaching the desired locality, before securing specimens, the birds were first studied and photographed at short range from a specially constructed umbrella blind. This was often placed in the heart of the bird community, as with the flamingos and pelicans, or even in the tree tops, as with the egrets.

Mr Chapman's description of bird life begins with an account of some of the commoner birds familiar in suburban life; then the reader is taken to certain famous breeding islands on the middle Atlantic coast, where he pictures and describes the gulls, terns, skimmers, fish hawks, etc.; then comes several chapters on Florida bird life, with remarkable pictures and many original observations on the brown pelicans, water turkeys, egrets, white and blue herons, spoonbills, and birds of like character, followed by a chapter on Bahama bird life, where, after three seasons of arduous and dangerous voyages amid the hundreds of miles of scattered coral reefs and islands, he succeeded in getting the only photographic series of the beautiful pink flamingo, in the very midst of a vast breeding colony that had escaped the watchful eyes of the native spongers, supplementing this series with an equally valuable collection of photographs and specimens of man-o'-war birds and boobies secured on an isolated coral reef in the southerly part of the Bahama group and some 60 miles north of Cuba.*

From the West India waters we are

* Described by the writer in the June number, 1908, of the NATIONAL GEOGRAPHIC MAGAZINE.

YOUNG FLAMINGO EATING SHELL OF THE EGG FROM WHICH IT WAS HATCHED

"The young stay in the nest until they are three or four days old. During this time they are brooded by the parents, one or the other of which is always in attendance. With a bill as large as their nestling's body, it was of special interest to observe how the latter would be fed. The operation is admirably shown on the opposite page. What in effect is regurgitated clam broth, is taken drop by drop from the tip of the parent's bill. This is the young bird's first meal. His next attempts at eating are of special interest. It will be observed that the bill in a newly hatched flamingo bears small resemblance to the singular, decurved organ of the adult. In the chick the bill is short and straight, with no hint of future curvature; and at this stage of its existence the bird feeds in a manner wholly unlike that employed by the old birds. It picks up its food. The second meal, then, consists of bits of the egg-shell whence the chick has lately emerged. When the bird is about three weeks old the bill first shows signs of convexity, and the bird now feeds after the singular manner of the adult, standing on its head, as it were, the maxilla, or upper half of the bill, being nearly parallel with the ground. Contrary to the rule among birds, the lower portion of the bill is immovable, but the upper portion, moving rapidly, forces little jets of water from each side of the base of the bill, washing out the sand and the mud through the strainers with which the sides of the bill are beset, and leaving the shells on which the bird subsists. Or, as Peter expressed it: 'It seems to me, sir, when de fillymingo feed dat de upper lip do all de wuk, sir, when he chomp, chomp, chomp, and grabble in de mud.'"—Frank M. Chapman.

FLAMINGOS FEEDING YOUNG

Note the straight bill of the young bird

FLAMINGOS ASLEEP ON THEIR NESTS

FLAMINGOS STANDING GUARD OVER THEIR NESTS: EACH NEST CONTAINS ONLY ONE EGG

FLAMINGOS IN FLIGHT

"Flamingos in flight resemble no other bird known to me. With legs and neck fully outstretched, and the comparatively small wings set half way between bill and toes, they look as if they might fly backward or forward with equal ease. They progress more rapidly than a heron, and, when hurried, fly with a singular serpentine motion of the neck and body, as if they were crawling in the air."—FRANK M. CHAPMAN.

TURKEY VULTURES: CALIFORNIA

YOUNG LONG-BILLED CURLEWS: WESTERN CANADA

transported thousands of miles across the continent to the California-Oregon boundary line, where the shallow waters of Klamath Lake contain many islands of rushes and are surrounded by treeless plains, with Mount Shasta in the distance. Here were studied and pictured the cormorants and gulls, the Caspian tern, but, above all else, the white pelicans, immense birds with a wing expanse of from 8 to 9 feet, many of which are shown in flight or standing amidst a collection of rude nests containing eggs and young.

Another chapter takes us to the Canadian Rockies at Ptarmigan Lakes, where beautiful pictures were obtained of the white-tailed ptarmigan in summer plumage, some of them standing solitary and alone on pinnacles of detached rock

FEEDING YOUNG WILD GEESE: WESTERN CANADA

or seated upon the nest, as the camera pictured the scene. From here Mr Chapman went to the sage-brush plains of Wyoming, where he made a study of the sage-grouse, the largest of North American game birds, with the exception of the wild turkey.

Another trip was made to the rolling plains of western Canada, at Crane Lake, Saskatchewan, where the wild fowl were studied and a collection of specimens made for the Wild Goose and Grebe Groups.

Then a trip was made to the Pacific Coast, where, in consequence of the widely varying climatic and physiographic conditions, a wonderfully rich fauna exists; for among the birds there are over 500 species and subspecies in California alone, or nearly one-half the number known in all North America.

On this expedition Mr Chapman gives an account of his efforts to photograph the condor in the mountains near Piru and his experiences with the shore birds at Monterey, the Brandt's cormorants on the rocky islets of the coast, concluding with an account of California's most famous bird islands, the Farallones—which are not only the largest in the state, but in the Union—where he pictures and describes the murres, as they cluster by the thousand upon the rocky promontories, the air filled with thousands of western gulls, while, in smaller numbers, the guillemots and the tufted puffins were pictured on the inaccessible cliffs, with the great waves of an unfet-

CALIFORNIA AND RING-BILLED GULLS: ON THE PLAINS OF WESTERN CANADA

CALIFORNIA AND RING-BILLED GULLS: WESTERN CANADA

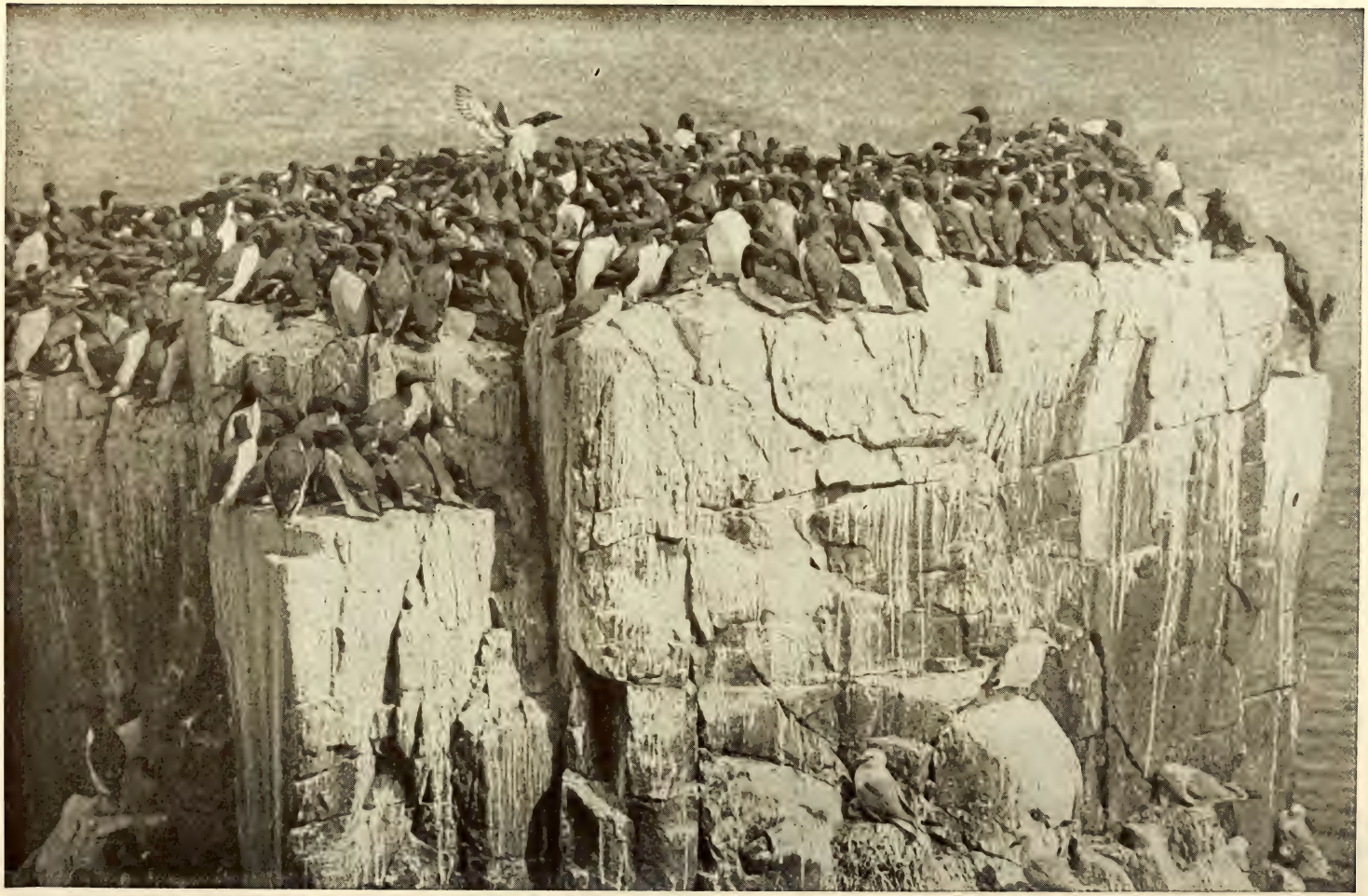
"These birds were far from shy, and on being approached merely rose in the air, where, facing the wind, they hung suspended, all calling vociferously. So closely did their position depend on the direction of the wind that one could walk around the flock of clamorous birds, viewing first their heads, then their tails, without their attempting to face the cause of alarm."—FRANK M. CHAPMAN.

A COLONY OF SEVERAL THOUSAND WHITE PELICANS ON BIG STICK LAKE, SASKATCHEWAN

"We must also accord to pelicans that respectful attention which is due of extreme age. Pelicans became pelicans long before man became man, a study of the distribution of the eleven existing species leading to the conclusion that at least as late as the latter part of the Tertiary period, our white pelican, and doubtless also other species, presented much the same appearance that it does today. In many of the numberless lakes of Manitoba, Saskatchewan, and Alberta, invariably upon the islands, white pelicans nest; a colony containing anywhere from a dozen to several thousand birds."—FRANK M. CHAPMAN.

WHITE PELICAN FEEDING YOUNG

Note the knob on the bill of the bird in the background at the left. The knob disappears after the mating season



MURRES ON THE PINNACLES: FARNE ISLANDS

The birds are so closely crowded on the table-like tops of the Pinnacles that a newcomer finds a foothold with difficulty. Photographed across the gap from the main island. See next picture

THE PINNACLES: FARNE ISLANDS

Basaltic columns split from the main island, the summits of which form islands in the air for nesting murres

tered sea hurling themselves with terrific force against the base, sending the spray high in the air until it nearly reached the narrow ledges covered with a myriad of feathered inhabitants.

The book concludes with an interesting account of Mr Chapman's impressions of English bird life, made on the occasion of his visit to that country in the year 1907. Here he was especially interested in the native birds of the British Isles, the cuckoos, starlings, rooks, and the nightingale, and, above all else, in the great breeding colonies of murres, gannets, puffins, auks, eider ducks, and gulls inhabiting the smaller islands along the English coast, and which with camera and pen he pictures and describes most successfully.

This story of winged life upon the plains, the mountains, the lakes, and distant seas, mirrored faithfully with the lens and the truthful pen of a discerning naturalist, shows that, after all, truth is stranger than fiction, and that it is not necessary to distort and falsely color the biography of the wild in order to interest the human race in the ways and habits of avian life.

IN BEAUTIFUL DELECARLIA

By Lillian Gore

WHEN the word Dalarne is spoken in a Swede's hearing it awakens memories of the struggles of the daring Gustave Ericson, who as the founder of the Wasa line threw off the hated Danish yoke; it brings vividly before him the boldness of the loyal people of this region in rescuing the life of this patriot prince when to harbor him was a crime, and his heart glows with that patriotism on which the Dalecarlians first put the stamp of highest approval.

But it is not alone the romantic history of this beautiful province that charms the native Swede and fascinates the occasional tourist. It is also the varied scenery—mountain and dale, lake and river—the good people whose honest faces attract attention and command respect, and the primitive vocations and occupations of the contented folk that make the dale land of Sweden the very focal point of interest to all.

The climate is very much like that of Stockholm, and yet in passing out from the city's walls and exchanging the stolid houses and sombre streets for the free air of Dalarne, its limpid lakes, tumbling torrents, wooded heights, lofty mountains, deep recesses, one feels as though a month's journey had been taken and that the wheel of time had made countless backward turns. In these remote settlements, the home of quaint superstition and harmless witchcraft, there silently grew up a hardy race, made earnest by their struggle for existence and patriotic by the wooing nature demands before she yields enough to satisfy their simple wants.

Their temperate and industrious lives enable them to pass patiently through the long winters, and when spring comes all hands, young and old, male and female, endeavor to make amends for the period of enforced idleness. Fortunately the long days help in this worthy endeavor. The children contribute their share by watching the cows, beginning as soon as they are able to toddle; when younger they rest in a sling on the mother's back as she goes to and from her work, knitting as she walks, or the sling, hung to a lower limb of a tree, is rocked by the gentle wind and the time quickly passes under the mother's watchful eye.

HOW SUNDAY IS SPENT

One's first impression of Dalecarlia is gathered at Mora Strand. Here the red houses cluster about the grand old church like chickens near the protecting motherhen. No one can tell you the age of this edifice, though all know that its high steeple was added in 1673. For many years it lacked an organ, to the sorrow of the faithful, for no other church in the dale was in equal straits. Charles XV offered to make good this deficiency, but when he had to acknowledge that he could not furnish a performer who would last forever they declined his generous offer.

Leksand, too, can boast of its church, a colossal structure of Russian style capable of seating 5,000 persons. It had been predicted that upon the completion of the church the Noret would be destroyed by fire and the church itself be swallowed up by the lake. The people anxiously awaited the completion of this building which was to be their pride. Unfortunately the first part of the prophecy was verified, but the church still stands, and I trust it may long remain in the matchless beauty in which I last saw it.

In order to realize why such a large structure was erected here it should be borne in mind that the Swedes have for ages been intensely religious, and for a long time the church at Leksand was the only one for miles around. The people came thither from all directions, many

A BEAU OF LEKSAND IN HOLIDAY ATTIRE

"The men when at work wear for protection a leather apron, and when once put on they, believing that it would give them a cold should they dispense with it, wear the apron every day and Sunday, too."

walking ten and twelve miles in coming and going, while those living nearer the lake met at convenient points and went in their great church boats. For many years the coming of these boats upon the strand at Leksand was one of the sights of Dalarne. Although the number of church boats has decreased, the size has not suffered any diminution. Frequently they are as much as 30 or 40 feet in length and seat 70 or 80 persons.

The best time for strangers to get a glimpse of the people of Dalarne is on a Sunday morning, when the church services bring together the faithful from near and far. Many come from a distance in the two-wheeled gigs or in the great church boats. The children, too,

A LEKSAND BRIDAL COUPLE

MAKING LACE

will be there, and when they show signs of restlessness they are given an apple or a garlic, so that by the time the preacher reaches his "few words in conclusion" there is a decided odor of onions in the church. Since this is about the only time when the good people are assembled, every advantage is taken of the occasion, and a farmer who has a pig, calf, or colt to sell brings it with him, and as soon as the benediction is pronounced the would-be purchasers assemble about the proffered stock and discuss their defects instead of those of the sermon. While this use of the time and place may not be the best, it is more practical and less hurtful than the exchange of gossip so common in the more fashionable churches.

After service those who came from a distance may visit friends in the village or walk through the shady groves, but at a given hour they reassemble on the beach and start on the homeward journey. As they row up the lake, men and women bending rythmically over the oars, the bright hues of their costumes flash out like kaleidoscopic colors in the bright sunlight, and the hills echo the hymns they are singing.

ALMOST EVERY ARTICLE WORN IS MADE AT HOME

Home industry is practiced and almost every article worn is made at home. In Leksand the women's skirts are of black homespun, with a gayly colored band about the waist. The same kind of skirts are worn both in the fields and at church, the only difference being that a newer one is selected for the latter occasion. An apron is ever present, the one for every-day wear is striped and of many colors, while a green apron is needed for some prayer days and a red one for others. The *ofverdel,* as it is called, shows only the sleeves. It is white and made of homespun linen, and is so carefully preserved that some see service for many years.

The one I have was made in 1854. Here the fondness for embroidery shows itself in decorating the sleeves near the shoulders and at the wrists. The bodice is of red material, also of homespun, made with narrow black strips, and a cap of the same goods for unmarried girls, while the married wear a cap of white, and for mourning a white square kerchief is laid over. Yellow is the color that rule prescribes for mourning, and for wedding nothing but blue will answer. In this last-named case the apron has for a trimming a narrow braid stitched across the bottom.

The wedding dress is further ornamented by the addition of a variety of ribbons and bits of finery not worn on ordinary occasions, together with a silk body more or less covered with embroidery. Around the neck is worn a bright-colored kerchief, which gives way on wedding and holidays to a kerchief of long ago, richly embroidered with black silk in cross-stitched pattern. On these occasions the old leather belt is brought forth and worn above the narrow belt of the skirt. This leather girdle, quite covered with pewter stars, is buckled in front, and on either side ribbons are looped on to designate brides and bridesmaids.

The children wear a dress of bright orange color, and while small and hardly able to support so much clothing of such variety, they are decked out with apron and kerchief like that of their older sisters, but with caps of a different shape. It is well that they are not the same, for to arrange the cap of a grown-up person requires no little skill.

The hair is divided into two parts. If long enough it is wrapped with white tape and the whole put in a coil around the head; if the hair is too short a flax twist or switch is made use of for a similar purpose to round out the head into its proper shape. Over the foundation thus laid the cap is tightly drawn down over the ears. It is very comfortable, if properly put on, and in winter it helps to keep the ears warm.

FARMING UNDER DIFFICULTIES

In the country districts of Sweden the women assist the men in the farm work,

and in going out to their daily tasks the bright colors of their costumes blend harmoniously with the green grass and rich foliage.

They do not make the plea that, being the weaker sex, they should have the lighter work. Even if the men swing the scythes, the women deftly toss the new-mown hay in the sun and hang it upon racks to dry. The men when at work wear for protection a leather apron, and when once put on they, believing that it would give them a cold should they dispense with it, wear the apron every day and Sunday, too. However, when Sunday demands the long "church coat," the leather badge of work is laid aside for the day.

Because of the insufficient supply of warm sunshine in this high latitude it is necessary to hang the cut grain upon racks to ripen. When properly cured it is hauled to the barns upon two-wheeled carts, there to rest until a lull in the general work permits the annual threshing. This labor calls into service the entire force of the farm—men, women, and children—some to pass the sheaves, one to feed the machine, another to pitch the straw, and others to take care of the grain, while I won the everlasting gratitude of my farmer host by driving one of the horses on this important occasion.

The farms are usually small, for the owner upon dying divides it in equal shares among his children, and these shares after repeated subdivisions become mere patches. Sometimes one may buy out his brother, or he may secure possession of one or more distinct parcels and thus own a number of disconnected pieces. My host was the owner of 26 such tracts, some exceedingly small and so narrow in fact that a horse and wagon could not be turned around upon one of them, and others were several miles from his home.

Many farmers have back from the lake in the hill country pasture land or ground too rough or too remote for cultivation. Here the stock, and especially the cows, are kept during the summer months. In this distant retreat one or more members of the family remain to look after the cows, make butter and cheese, pack away a supply for winter use, and cure such hay as may not be needed for the grazing cows.

The flax, which in its finished state forms such an important part of the dress of men as well as women, and used so extensively in making the bed and table linen, is raised on many farms. At one time every farmer had his patch of flax, but now the manufactured goods are crowding out the home-made and only the old-fashioned folks, who will not be satisfied with anything but the best, still hold fast to the products of their own looms.

The lace also, which plays such an important rôle in ornamenting the fancy kerchiefs and head-dresses, is a home industry. Each parish has its own patterns of lace, and the expert in one pattern has no temptation to learn a new one, but goes on perfecting herself in the pattern of her own parish.

The houses of the farmer class are very simple, made in many cases of rough, unhewn logs, with the cracks filled up with the moss which grows in such abundance here. In one corner of the room are two stationary beds, one above the other, in another corner the great open fireplace, and benches are about the walls. A plain table, wooden bowls and spoons, and a corner cupboard, in which the household treasures are stored, complete the furnishing of the average home. A narrow shelf over the window is the place of honor for the Bible and the book of Psalms, and near by is suspended the long pole on which is strung the loaves of ring-like rye bread to dry. This bread apparently never grows stale, but is always just to the farmer's taste.

Here, as elsewhere in Sweden, coffee is all-important. The first thing in the morning is coffee with "dip"—that is, a bread of finer texture baked especially for this purpose; then at 9 o'clock breakfast, a rather substantial meal with potatoes, fish cooked on glowing coals, and frequently a kind of gruel for those who

IN THEIR SUNDAY ATTIRE

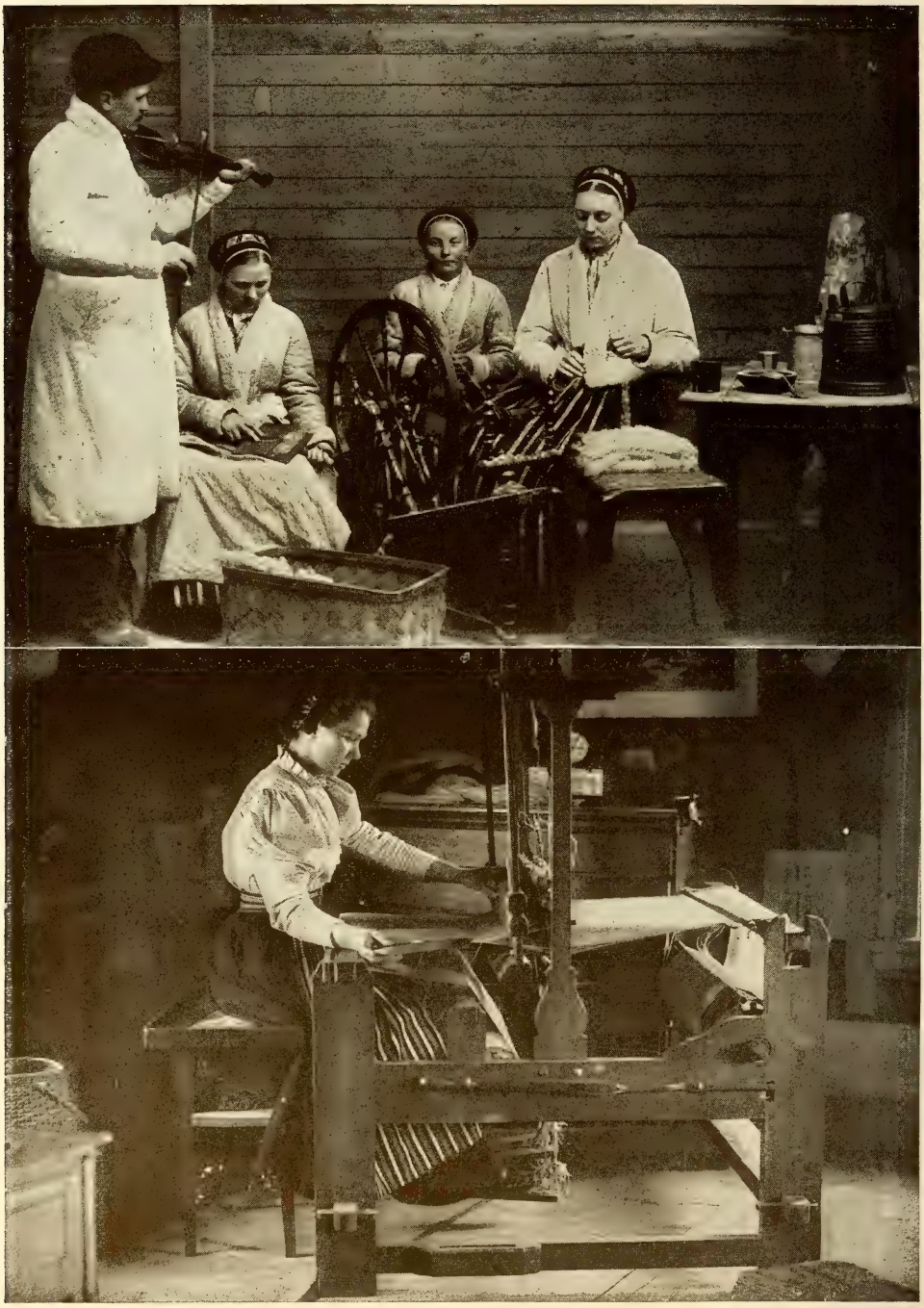
are specially fond of milk. In about two hours all hands are ready for more coffee, and this stays them until they stop for dinner at 1 or 2. This resembles breakfast with the occasional addition of meat, and the frequent appearance of "Svagdricka"—a weak drink. This national beverage is made of hops, and although it quickly becomes sour, it is always held in high esteem. The afternoon work is broken at 4 for more coffee, and if the laborers are in the field some one stops long enough to fetch it.

I have often had the pleasure of joining the happy group, sitting with them on the ground and enjoying for a while their merry chat and well-earned rest. In Dalarne it is customary to pour enough into the cups to completely fill it and at least half the saucer, for anything less than that would betoken stinginess—an accusation most hateful to these generous people. When the day's work is done and the tools put away, all sit down to "gröt och mjölk," a kind of porridge of rye-flour and water. This dish would hardly be palatable to an American, but to the Swede it has a natural taste. When cooked it is put in a big earthen dish in the middle of the table so as to be in reach of all. Each one being provided with a bowlful helps himself to milk, and taking up the porridge, a spoonful at a time, dips it into the milk and eats, the operation being continued until hunger is satisfied.

Nothing is more enjoyable than the farm life here. The people in their natural simplicity are a continual source of interest, their honesty is proverbial even in Sweden, and they place such a high estimate upon truth that they never suspect falsehood nor deception.

PICTURESQUE ORSA

The most interesting, but the least known of the parishes of Dalecarlia, is Orsa. It is the least known because



CARDING, SPINNING AND WEAVING IN A SWEDISH HOME

A FARMING SCENE

A WASA MONUMENT AT RÄTTWIK

THE ORNÄSSTUGAN, OLD BUILDING IN DALARNE

tourists visiting this center of Sweden's many attractions usually think they have seen all when Leksand and Rättwik have been thoroughly inspected. And then until recently the means for penetrating thus far into the Scandinavian Peninsula were not at all attractive. Now one has quite a choice of routes: a railroad connects Rättwik and Orsa, and during the summer a comfortable boat plies between the places named, while a good road leads directly from Leksand to Orsa, 45 miles distant, over which the cyclist can wheel or the leisurely inclined traveler may be carried in a hired conveyance.

This parish is noted for its strong, handsome people, and the thrift and industry of old and young are proverbial. The women here, as in all the rural districts of Sweden, assist the men in the farm work, but when winter comes to call the men away to the woods or to the grindstone quarries, they are left at home to look after the house and farm, children, and cattle. In other days, as we learn from song and saga, the long winters of enforced idleness rested heavily upon the inhabitants of Orsa, and many times before spring broke the icy barriers against the supplies coming from the south it was necessary to eke out the stock of flour by mixing with it pulverized bark. But now the scarcity of timber in the more accessible districts has sent lumbermen here to make the hillsides yield their harvest and every one is deriving therefrom immediate if not ultimate profit. To such an extent is this true that we find here a parish so rich from the revenues of its own lands, that all property is exempt from taxation.

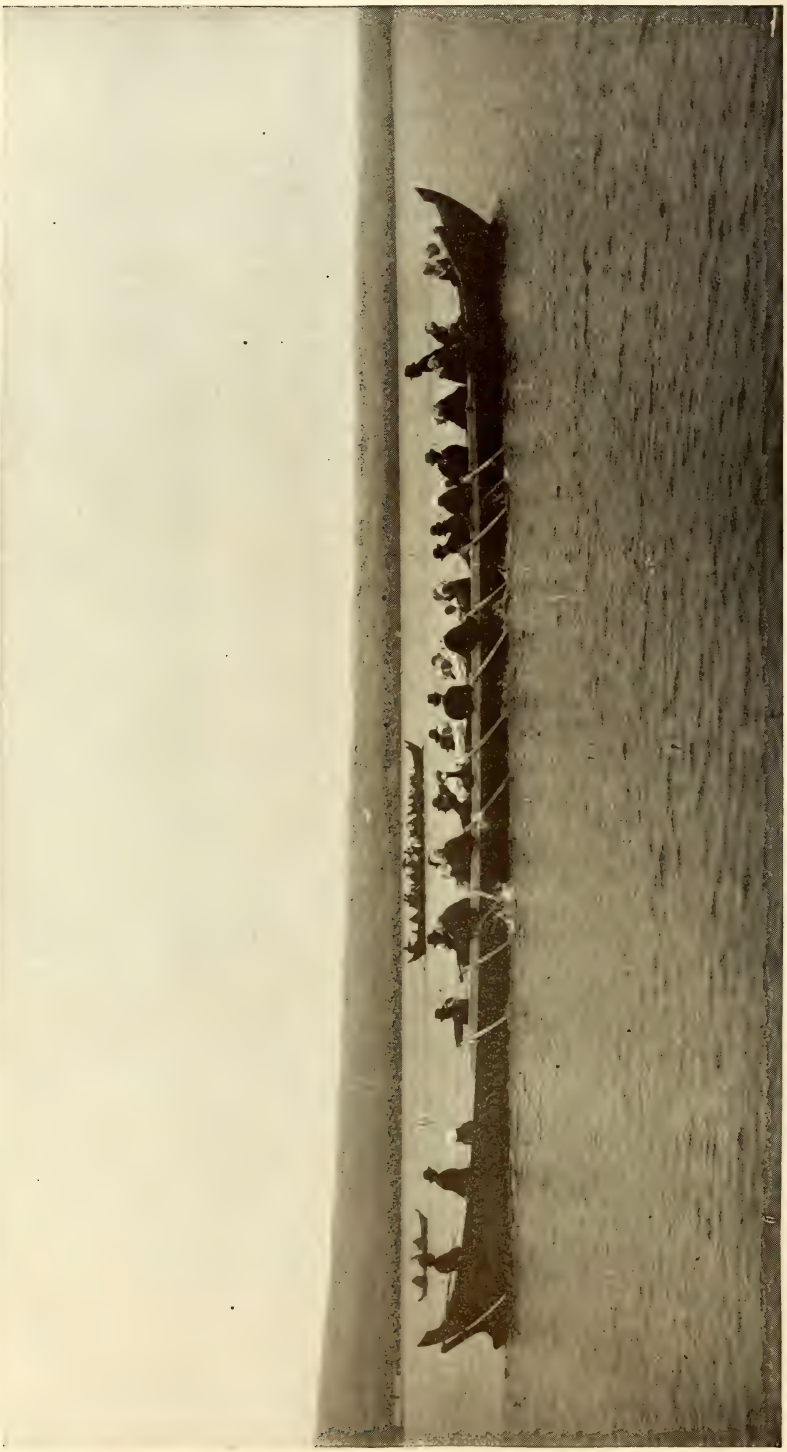
The language of these hardy mountaineers is unlike that of their nearest neighbors, and it is with difficulty that mutual conversation is carried on when they meet. However, intercourse is so rapidly eliminating these linguistic differences that an interpreter is not needed, as was said to be the case a generation ago.

I have visited Orsa on various occasions, usually, however, during the busy summer season, when every effort was being put forth to secure as much food and fuel as possible for winter use, but on my last trip to the Daleland a fair furnished the opportunity of seeing them in their holiday attire, with all thoughts of work and winter out of their minds. It was a joyous sight. Old as well as young were enjoying the well-earned rest, and finery but seldom seen was on this day getting a good airing. The stranger was welcome, especially when my Dale dress showed that curiosity had not prompted the visit.

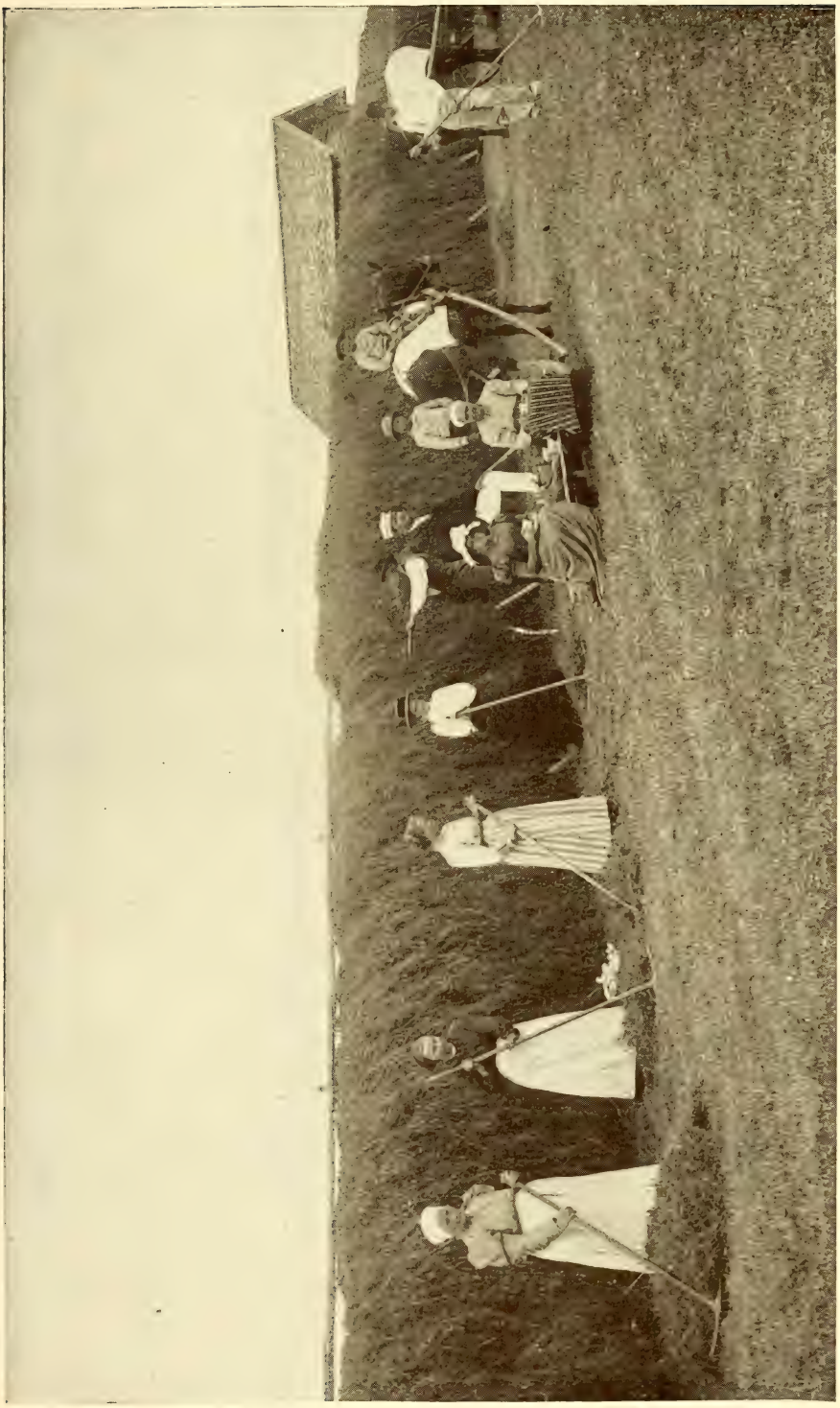
After watching their games for some time I thought it a good time to drop in at a few of the country houses to gather from such of the old folks as might have staid at home some of their folk-lore. But after driving from place to place, into by-ways, and up the mountainsides without finding any one at home, we were forced to the conclusion that everybody was at the fair. And why shouldn't they be? The summers are short at best and the long winters, with their dreary nights keeping the families closely housed, afford no opportunity for fun or merry-making. An important feature of this fair was its bazaar, where each person could offer for sale such articles as they wished to dispose of. Here were seen in abundance caps and mittens, robes and blankets, and numerous articles made of that tightly woven, undyed woolen goods, known as wadmall, which stood Nansen in such good stead during his stay in the far north.

IN THE LUMBER CAMPS

With the approach of winter the men leave home for the ever-receding lumber camps, where biting winds and heavy work will be their portion as long as the snows lie on the ground to slick the roads over which the logs are drawn. The camps are simply log huts, not so well built as the cosy houses they left, and the great fire built in the middle of the room does little more than keep warm the feet of the men as they lie about it. This fire must be kept up all night, so the men take turns as firemen, while



ROWING TO CHURCH IN DALARNÉ (SEE PAGE 465)



HANGING THE NEW-MOWN HAY ON RACKS TO DRY

OLD AND YOUNG CITIZENS OF DELECARLIA

others must every now and then give the horses some exercise to keep them from freezing.

The logs are drawn on sleds to the banks of the streams, there to rest until spring comes, when they are floated down by the rushing waters coming from the melting snows. This is the most dangerous part of the work. At all points where the logs might become wedged in between opposite banks, or where a sharp turn in the stream would cause the logs to be thrown upon the shore, there men must be stationed who with long poles try to keep the logs in the channel, and that, too, without delay, for hundreds and thousands are hurrying down, and if two or three should become fastened there would be a jam which might require weeks of work to loosen. In this labor men are frequently knocked into the current and drowned before the eyes of their comrades.

Equally laborious, though less exposed, is the work in the porphyry beds at Elfdahl, where a large number of men find employment during the winter months. This industry, first developed to afford relief from a famine that threatened Orsa in 1788, has been a continual source of profit to its promoters. One of the finest objects ever cut here is the gigantic vase made from a single piece of stone and measuring 9 feet in height and 12 feet in diameter that now stands in the deer park at Stockholm. It was in one sense a votive offering made by the people to their king, Charles XIV, who as owner of the quarries did so much towards their development, chiefly as affording work for the men of this section, and now his remains rest in a sarcophagus of porphyry from these self-same quarries.

Near Falun, the great mining district of Dalarne, lies Lake Runn, on whose bank rests the famous Ornasstugan, or cottage of Ornas. It is not only a splendid example of the architecture of two centuries ago, but it is one of the cherished monuments to the wonderful escapes of Gustave Wasa. The building belongs to the state, and in the room which was occupied by the great liberator during his short stay here, we find an interesting museum.

If you wander for days throughout this land the eyes will ever see something new, and the ears he daily gladdened by the recital of the legends of long ago or the quaint myths of today. Monuments on every hand tell of the loyalty of the early heroes, and strong arms and earnest faces plainly show that their beloved king would not be obliged to call long nor loud for loyal defenders.

There forests rule in gloomy grandeur,
There rivers break 'gainst rock and shore:
A glorious land! Yes, honest Daleman,
Which none can see to see no more.

MAKING FLAX

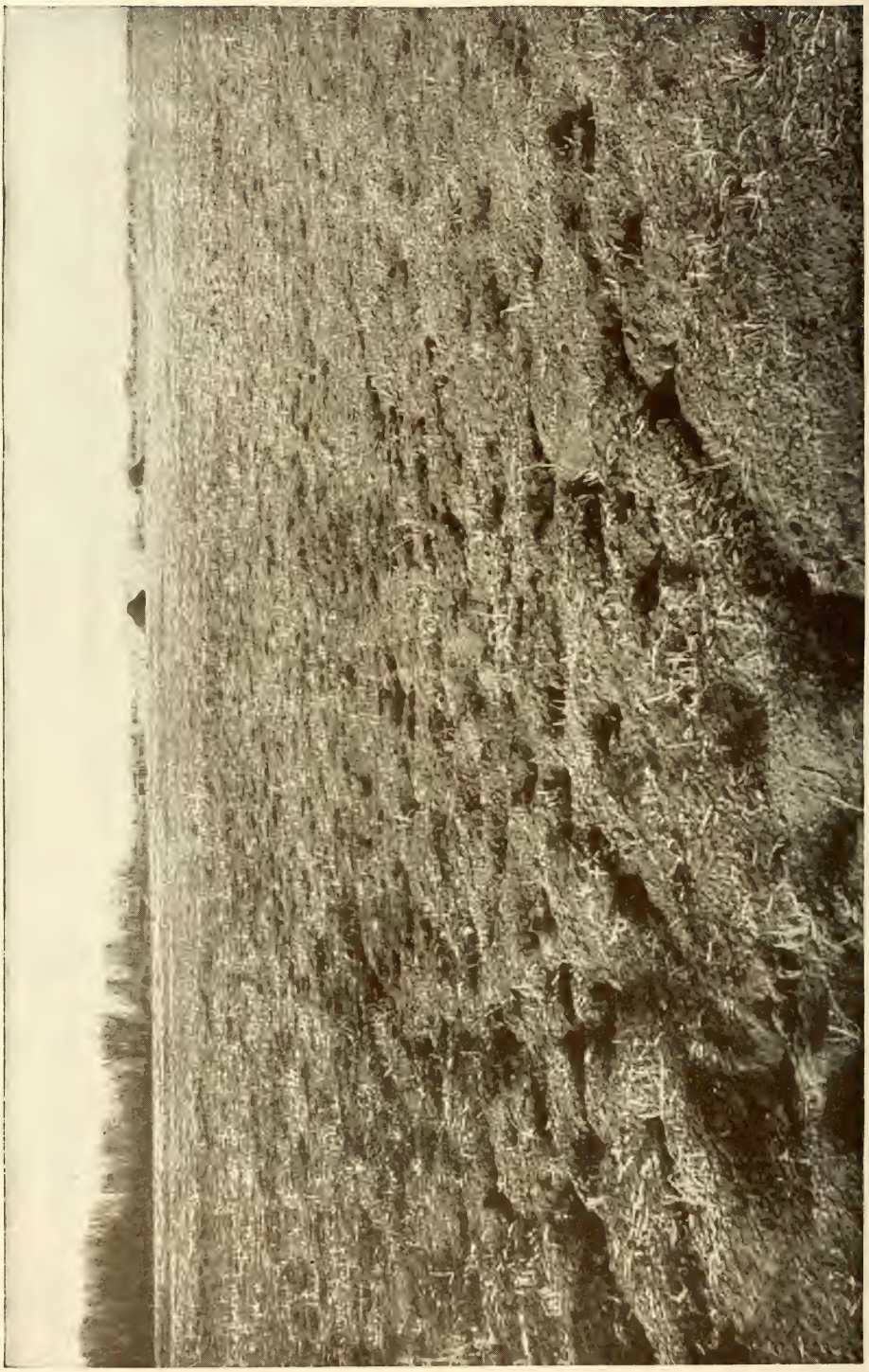


Photo from Stanley E. Piper, U. S. Biological Survey

AN ALFALFA FIELD RUINED BY MICE IN HUMBOLDT COUNTY, NEVADA

A PLAGUE OF MICE*

The work of the United States Government does not cease when irrigation projects are completed and rich farms developed by the settlers. New problems arise, to meet which not an engineer, but the trained government biologist, is required. The scourge of mice which in Nevada destroyed harvests worth hundreds of thousands of dollars would be repeated many times were it not for the genius of the experts of our U. S. Biological Survey, who have shown how destruction by such pests may be averted in the future.

DAMAGE by field mice attracted the attention of the ranchmen in the lower part of Humboldt Valley, Nevada, early in the spring of 1906, and became severe during the following summer. In the fall and winter of 1906-07 damage had increased until fields here and there in the valley were seriously injured.

By October, 1907, a large part of the cultivated lands in this district had been overrun by vast numbers of mice. The yield of hay had been reduced by one-third; potatoes and root crops were largely destroyed; many alfalfa fields were ruined by the mice eating the roots of the plants, and the complete destruction of this, the chief crop in the valley, was threatened.

The height of the plague was reached in November, when it was estimated that on many large ranches there were from 8,000 to 12,000 mice to each acre. The fields were riddled by their holes, which were scarcely a step apart, and over large areas averaged 150 to 175 to the square rod. Ditch embankments were honeycombed, and the scene was one of devastation. Serious losses in hay and root crops during the summer proved but a slight forerunner of the damage which began in the fall with the disappearance of green food. Burrowing down about the plants, and extending their underground runs from root to root, they either killed or seriously injured the alfalfa (see page 480). By November they had destroyed so large a percentage of the plants that many fields were plowed up as hopelessly ruined (see page 478). They attacked also the roots of trees, seriously injuring or quite destroying orchards. They killed most of the young shade trees planted along ditches, and so completely girdled large Lombardy and silver poplars (see page 481) that in some cases they caused the death of even such hardy trees.

The great majority of ranchmen knew neither what to expect from such great numbers of mice nor how to check them. Such plagues had usually been allowed to run their course until brought to an end by natural agencies. Hence it is not surprising that in Humboldt Valley no concerted or systematic efforts to suppress the plague in its earlier stages were undertaken, but after the mice swarmed in thousands over the fields many attempts were made to destroy them by distributing wheat poisoned with phosphorus. These, however, were spasmodic and generally proved futile, as the fields experimented on were quickly reinvaded from adjoining lands. While a few fields favorably located were saved by early poisoning, the results of such unsystematic efforts amounted to practically nothing in overcoming or even materially checking the plague.

The preparation in general use by ranchmen consisted of wheat treated with a strong solution of yellow phosphorus in carbon bisulphid, a cheap and effective poison for field mice, but inflammable, explosive, and dangerous to birds. As a result of its extensive employment in the valley, California quail, an introduced species, were decimated, and magpies, crows, meadow larks, and

* Abstracted from "The Nevada Mouse Plague of 1907-08," by Stanley E. Piper. Farmers' Bulletin 352, U. S. Department of Agriculture.

Photo from Stanley E. Piper, U. S. Biological Survey

ALFALFA PLANT KILLED BY MICE

smaller seed-eating birds suffered extremely. On one occasion 67 horned larks were found dead on about 4 acres a few hours after the poisoned grain had been distributed. Fortunately hawks, owls, gulls, and ravens were not affected, but many skunks and domestic cats were killed as the result of eating mice dying or dead of phosphorus. Several accidents occurred in handling the solution, and cases of fatal poisoning of live stock were frequent.

Several attempts by ranchmen to induce contagious diseases among the mice by means of advertised bacterial preparations failed.

ASSISTANCE OF THE U. S. BIOLOGICAL SURVEY REQUESTED

Chiefly through the coöperation of Mr George S. Webb, manager of the large Rodgers ranch, systematic experiments to destroy the pests, undertaken early in January, 1908, by the Biological Survey, demonstrated that such mouse plagues can be controlled and the greater part of the losses prevented. The experiments of the Survey proved that mice can be effectively destroyed in winter by alfalfa hay poisoned with strychnia sulphate, and this preparation was generally recommended in the valley. On the Rodgers and Anker ranches a force of 7 to 15 men was employed to distribute the poison in the fields, with most satisfactory results, and without the dangers incident to the use of phosphorus and grain.

By March 15 poisoning, supplemented by natural agencies, had destroyed the mice on several thousands of acres where they were most abundant, and the plague was broken before the remaining alfalfa fields had been overrun. In scattered centers mice continued in destructive numbers until May, but without regaining to any considerable extent by reproduction they steadily decreased. Later in the summer they had almost disappeared from the valley.

$300,000 DESTROYED BY THE MICE

The scourge of mice had swept over about four-fifths of the cultivated area in the lower part of Humboldt Valley. Of 20,000 acres in alfalfa, about 15,000 were so seriously injured as to require plowing and replanting. Over most of this area the alfalfa was replaced by grain crops for the season of 1908 at great expense and loss, since good alfalfa lands pay gross returns of from $60 to $70 per acre, while good grain crops return only $35 or $40 per acre.

The shortage of hay on the Rodgers ranch, where 2,200 acres were in alfalfa, was estimated at 2,000 tons. On Anker's ranch of 650 acres it was estimated at 600 tons. Other ranches suffered in proportion, and the loss of hay in the valley amounted to not less than $50,000. W. C. Pitt, who farms 1,400 acres of alfalfa, estimates his complete loss at $20 per acre, or $28,000. John Font estimates his damage on 1,000 acres at $20,000, and Mr Anker considers his loss on 650 acres to be $8,000. Mr Webb, on the Rodgers ranch, figures the complete loss on 2,200 acres, part of which pays considerably short of the best returns, at $30,500.

Photo from Stanley E. Piper, U. S. Biological Survey

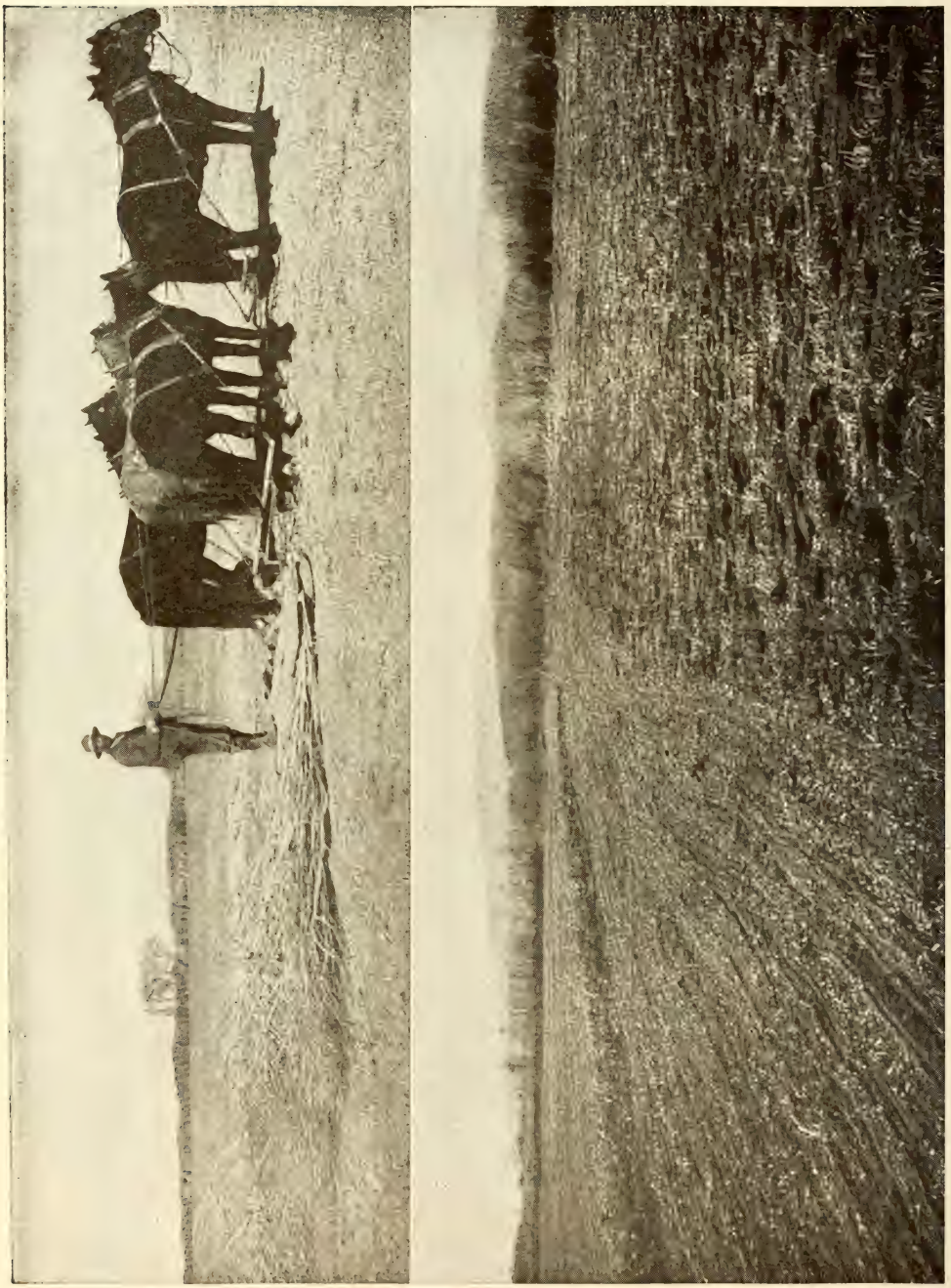
LOMBARDY POPLAR GIRDLED AND KILLED BY FIELD MICE

A careful consideration of the losses in hay, pasturage, root crops, and trees, the expense of restoring alfalfa fields to their former condition, and deducting the value of a grain crop for 1908 shows the average loss to be about $20 per acre. On this basis the damage to the valley amounted to $300,000.

Simultaneously with the plague in the lower part of Humboldt Valley mice appeared in enormous numbers farther up the Humboldt River and its tributaries about Winnemucca, Battle Mountain, and in Paradise and Little Humboldt valleys. As the lands infested in those districts were chiefly great natural hay meadows of red top and wild clover, the damage was less severe. However, gardens and isolated alfalfa fields were seriously injured. Later, reports of mice in alarming abundance were received from King River, Quinn River, and Carson and Smith valleys, Nevada; from Weber River Valley and from Sanpete and Utah counties, Utah, and from Honey Lake Valley, California. In none of these localities was the damage so extensive as in Humboldt Valley, though plagues of like severity were plainly threatened.

PLAGUE AVERTED IN CARSON VALLEY BY THE U. S. BIOLOGICAL SURVEY

On learning of severe damage by mice in Carson Valley, a hundred miles southwest of Lovelocks, in April, 1908, the U. S. Biological Survey sent several assistants to the valley to check the threatened plague. Carson and Humboldt valleys are alike in having large areas in alfalfa bordered by desert lands, on which field mice do not live. On a tract of about 2,500 acres near Minden mice were found to be excessively abundant, and in some fields 10 to 25 per cent of the alfalfa plants had already been destroyed. Several smaller centers were similarly affected, while over the valley generally the mice were somewhat in excess of normal numbers. This was a condition similar to that presented in Humboldt Valley during the spring of 1907, and young of all sizes were abundant. Examination of many females, a large percentage of which were pregnant, showed an average of from 6 to 7 young, while in a number as many as 10 were



USING THE BRUSH DRAG TO OBLITERATE MOUSE HOLES

In a field so badly overrun by mice as the one shown in this illustration, the drag prevents waste of labor and poison. Poison is placed in the new holes opened by the mice after the drag has passed

found. Although alfalfa was already well grown, furnishing the mice abundant food, by systematic poisoning, under the direction of the Biological Survey men, they were so effectively reduced in the infested areas as not to be dangerous again during the season—in other words, a plague was averted.

The results actually obtained here prove that mouse plagues can be checked. It takes several seasons to produce a general plague of mice, and damage is noticeable for at least a season before a serious outbreak occurs. Though natural agencies may be depended upon to overcome such abnormal numbers finally, yet, unless active repressive measures are taken, enormous damage to crops will result. Control, easy at first, becomes more and more difficult as the mice increase in numbers, and, after a plague is well established, is very expensive.

In Humboldt Valley, in the beginning, a little poisoning with green alfalfa or crushed wheat would have sufficed to prevent the plague. During the fall and winter of 1906-07, when the mice seriously injured fields here and there, they could have been destroyed with poisoned alfalfa hay. Even during the summer of 1907 concerted and vigorous poisoning would have destroyed them at a cost small indeed in comparison with the damage they inflicted later.

HAWKS, OWLS, WEASELS, AND COYOTES PROTECT THE FARMER

Of the many remarkable features of the mouse plague in Humboldt Valley, none is of greater interest, or indeed of greater significance, than the large numbers of birds and mammals which gathered to feed on the mice. Under rows of trees, about the bases of fence posts, and scattered everywhere in the fields were regurgitated pellets of mouse fur and bones, affording abundant proof of the services rendered by birds, while many holes and destroyed nests in the fields showed the work done by skunks and coyotes. So apparent was the assistance rendered by these creatures that it attracted the attention and secured the protection of the farmers, many even sparing the coyote, whose services as a mouse destroyer deserve to be more widely recognized. In Nevada coyotes were frequently seen catching mice in the daytime, and their droppings were

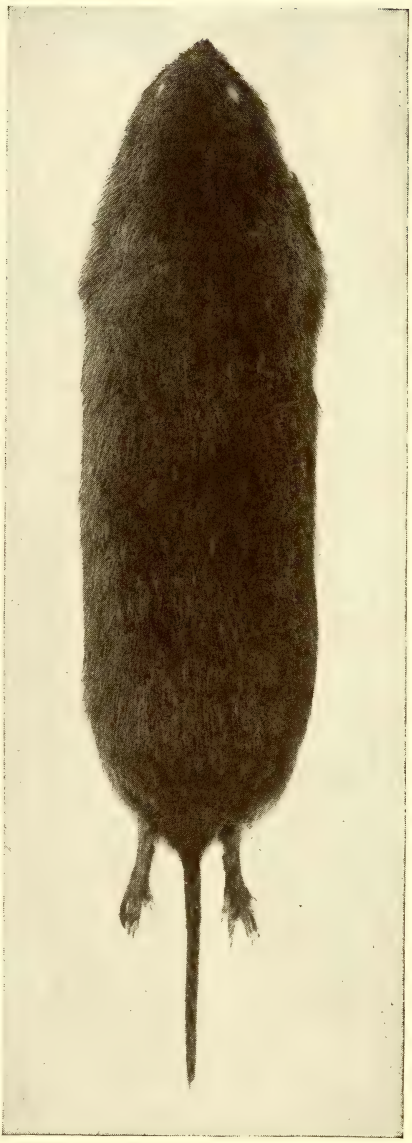


Photo from Stanley E. Piper, U. S. Biological Survey

THE MOUSE WHICH PRODUCED THE PLAGUE IN NEVADA (MICROTUS MONTANUS)

Photo from Stanley E. Piper, U. S. Biological Survey

MEN DISTRIBUTING POISON TO KILL THE MICE

composed entirely of mouse fur and bones.

It is deplorable that, even when their usefulness is as apparent as here, some persons continue to destroy valuable birds and mammals. During the investigations in Humboldt Valley no less than 29 large hawks were found hanging on wire fences, their useful lives ended by thoughtless gunners.

The striking evidence of the valuable services of the natural enemies of mice seen during this plague is but an example of their constant value. Hawks, owls, gulls, crows, ravens, herons, and shrikes among birds, and skunks, coyotes, foxes, weasels, badgers, and wildcats among mammals, habitually prey upon field mice, and are most valuable in preventing undue increase of these pests.

Thorough studies have shown hawks and owls to be most beneficial allies of the farmer, orchardist, and nurseryman. Most species rarely, and many of them never, attack poultry. In the Nevada valleys all species of hawks and owls are distinctly beneficial, and here rigorous protection cannot be too strongly advocated.

Among mammals the weasel and the skunk are especially worthy of protection. They are most persistent enemies of mice, and are less likely to be driven out by civilization than are other mammals. When particular individuals raid poultry houses it may be necessary to destroy them, though usually it is easy to make such houses proof against their attacks. Far from being a menace, they are generally most beneficial mammals, and, living, are worth many times the value of their pelts.

It is gratifying to note that in many localities the people are learning to appreciate these natural enemies of rodent pests, for even more important than legislation for the protection of valuable birds and animals is the recognition of their services by the farmers.

In Nevada it was noticed that hawks and owls hunted chiefly in fields near the few plantations of large trees to be found in the valleys. Beneath these trees the ground was fairly carpeted by disgorged

pellets of fur and bones, representing thousands of mice. While certain species of hawks seldom frequent trees, others habitually perch in them, notably the large rough-leg, Swainson, and red-tail, which were the most abundant and persistent mousers. In nearly all of the valleys, even those which have been farmed for years, the absence of trees is notable. More trees along ditches, about the borders of fields, and in groves here and there would doubtless increase the number of valuable resident hawks and owls and attract more winter visitors.

It was estimated that during the height of the outbreak birds and mammals destroyed some 45,000 mice daily. Although their combined assaults unaided did not suffice to abate the plague, yet when the number of mice was reduced by poison, and long before it approached the normal, they were able not only to prevent increase, but to cause a rapid decline, which continued until the mice became so scarce that the predatory birds and mammals were forced to scatter and look elsewhere for food. It is fair to infer that had these friends of the farmer been protected in the beginning they would have been able from the first to hold the mice in check, preventing the abnormal increase so that there would have been no plague.

The mouse which produced the plague in Nevada, locally known as "black mouse" (see page 483), is the Carson field mouse (*Microtus montanus*), one of the numerous species of short-tailed field mice or meadow mice, a group which has caused widespread destruction in various parts of the world. This field mouse is rather widely distributed in the valleys of Utah, Nevada, northeastern California, and eastern Oregon. In nearly all parts of the United States short-tailed field mice are among the most abundant of mammals, and a number of species in widely separated localities have occasionally exhibited the same tendency to excessive increase, indicating that favoring conditions may produce mouse plagues wherever the mice exist. Even when in small numbers they destroy considerable clover and alfalfa and injure orchards, nurseries, and root crops.

This is the first recorded instance of an irruption of field mice in North America attaining the proportions of a plague. The experience indicates the probability of future and even more disastrous outbreaks. In the extensive reclaimed areas of the West the abundant food and luxurious cover furnished by alfalfa fields and the miles of irrigation ditches, which afford these mice suitable homes along their banks, greatly favor their increase, while surrounding desert conditions limit the spread of mice beyond the cultivated areas.

THE NATIONAL GEOGRAPHIC SOCIETY AND GEOGRAPHIC WORK

THE extraordinary growth of this Society has made it incumbent on its Board of Managers to correspondingly increase its power and influence as an educative force in America. The main objects of the Society are the increase and diffusion of geographic knowledge, which must be done by three distinct methods—those of publication, of encouragement, and of research. The Board of Managers has given much attention of late to a consideration of the means best calculated to produce results in keeping with the great importance and with the high aims of the Society as a whole. Definite policies with regard to research work having been adopted during the past month, their tenor is herewith communicated to the members, together with a general review of the work of the Society.

PUBLICATION

The only regular publication of the Society is the NATIONAL GEOGRAPHIC MAGAZINE, which all members receive regularly. Every effort is made to cultivate an interest in geography by the presentation in popular and acceptable form of articles bearing on geographic subjects of general and timely importance. These articles are written by individuals thoroughly familiar with the subjects; they are illustrated fully and beautifully, while maps of value frequently supplement the text. No expense or care is omitted to make the Magazine beautiful in typography, accurate in statement, and interesting in matter.

The African number (March, 1909) may be considered as typical of our policy of uniting the various phases of science, exploration, sport, and pleasure. In our current number we present one of our frequent articles describing some line of work of the Federal Government, in this case the making of homes for millions of people on the arid desert. In our June number we shall present an article on "Ascents of Notable Peaks," with a series of illustrations of the most beautiful and most famous mountains throughout the world.

Our July number will be a special number describing the great and almost unknown Territory of Alaska: its unrivaled glaciers, superb mountains, and rapid economic development.

The Magazine will continue to give members the splendid illustrated articles of travel in and description of all parts of the world that have made the publication so indispensable in the past, and we hope to add other features, which are made possible now that the income of the Society, because of the popularity of its Magazine, has increased to such an extent that more money can be expended on the publication.

In this connection the attention of the members of the Society is invited to the fact that the first five numbers of the Magazine of this year contain 490 pages, while the same numbers in 1908 contained 386 pages.

ORIGINAL RESEARCH

The Board of Managers has long desired to prosecute, in behalf of the National Geographic Society, research work of importance and in an extended and continuing manner. From time to time the Society has extended assistance to individuals engaged in geographic work of special interest, but lack of means has naturally restricted operations to intermittent and minor occasions. At its last meeting, however, the Board of Managers set aside the sum of five thousand dollars, which is to be expended under the direction of the Committee on Research, Henry Gannett, Chairman, during the coming year, on such original research as may be thought most timely. An announcement of the work undertaken will be made in the next number of this Magazine.

In addition there was appointed a committee to raise by subscription a special fund, which shall be devoted to geographic exploration and research. It is thought that the time is ripe for such efforts, which would place America, as regards geographic work, on the same plane of generous support as now obtains in other countries. It is desired that such an amount may be raised as will make it possible for the Society to plan and carry out geographic explorations and research in an efficient, systematic, and persistent manner. The committee will present at an early day an outline of the most important geographic work to be done, accompanied by an appeal for funds for its accomplishment.

ENCOURAGEMENT TO RESEARCH

At its meeting of April 21, 1909, the Board of Managers took final and favorable action on a plan, long under consideration, for the recognition through suitable methods of geographic work of value or originality. Hereafter the Society, through its Committee on Research and Board of Managers, will regularly consider the question of awards for such specially meritorious geographic work as may be brought to its attention. The awards of medals, with or without

gratuities, will cover the whole field of geography as far as is practicable.

The adopted policy of the Society will be best understood by the publication in full of the report of a special committee, General Greely, Chairman, which was unanimously approved by the Board of Managers. The resolutions are as follows:

MEDALS OF THE NATIONAL GEOGRAPHIC SOCIETY

The medals shall be of two classes—Society medals and special medals. Society medals, being strictly representative of the National Geographic Society, shall be recognized as conferring the highest form of honor. They shall be awarded as frequently as there are works deserving them.

Society medals shall be of gold, and vary only in the superscription, which shall indicate the character of geographic service for which they have been awarded.

Special medals shall be such as may be instituted, with the approval of the National Geographic Society, from funds donated to the Society for the purpose of recognizing personal achievement in geographic fields, or to stimulate researches in the domain of geography. Special medals, or other similar awards, shall be known by the specific titles and awarded under such conditions as may be designated by the donors, the National Geographic Society acting as trustee for the proper administration of the funds and for the appropriate award of the medals.

This Society being national in its scope and in its membership, the geographic work of its members, and of other Americans similarly engaged, merit and shall receive careful consideration, especially when such work pertains to the continent of North America. Work of permanent and exceptional value shall not be ignored because of intervening time, but shall be recognized on the same basis as though of recent accomplishment.

Awards shall not be confined to exploration and discovery, but all fields of geographic research shall be properly recognized.

The Committee on Research (or other designated committee) shall from time to time recommend to the Board of Managers the issuance of medals. Such recommendations, to be in writing, shall in each case name the individual, set forth specifically the distinguished geographic service performed, specify the class of medal (whether Society or special), and formulate the inscription to be engraved thereon.

Ordinarily the award of medals shall be made at the annual dinner or other general gathering of the Society.

It is gratifying that this plan of encouraging geographic work by special medals for definite classes of work has already borne fruit. One of the active and generous members of the Society, Mr Grant Squires, of New York city, has made an endowment of five hundred dollars, which may be later increased in amount. The income is to be spent in awarding a special medal, with or without a gratuity in money, for such work as may increase our knowledge of the resources of the countries of the Orient and stimulate commercial relations of the United States therewith. The exact provisions of the endowment will be published with the proceedings of the Board.

It may be of interest to the members of this Society to learn that there are sixteen special medals and prizes which have been endowed by members of the Société de Geographie of Paris, which are known by names designated by the donors, and are awarded for classes of geographic work named in the endowment.

There is no reason to doubt that American generosity will similarly and speedily provide means for suitable medals and gratuities in recognition of special geographic work in which the donors may be interested. Such endowments are particularly suitable as memorials to those "on a happier voyage now toward no earthly pole," or in dedication to aspirations of the donor which time and circumstance did not permit to ripen into personal fruition.

ROOM FOR EXPANSION

The National Geographic Society has purchased for $11,000 the unimproved property on Sixteenth street adjoining Hubbard Memorial Hall. The lot fronts 28½ feet on Sixteenth street and is about 75 feet deep. If the growth of the Society continues at as rapid a rate during the next several years as during the past, additional room will be required for the business of the Society, and it was to provide for such contingencies that the ground has been acquired.

ILLUSTRATIONS OF A UNIQUE POT HOLE WORN IN A GRANITE BOULDER ON THE SHORES OF MONTEREY BAY, CALIFORNIA

The pot hole is above the level of low tide, but is submerged at middle to high tides. The first photograph gives a near view of the boulder, which has a rounded top and is about 4 x 5 x 3 feet. It also shows the pebble or "nest egg" which has eroded the crevice. The second photograph shows the size of the hole. Photos from B. X. Tucker, Richmond, California.

CUPS IN BEDROCK USED AS MORTARS FOR GRINDING ORE: INDIA

OLD MINES AND MILLS IN INDIA

EVER since England began the conquest of India old mine workings have been found in various states, and many references to them are made in the reports of the Geological Survey in India.

Several years ago a young engineer visited certain old workings in the Bombay Presidency, Southern Mahratta District, about 300 miles southeast of the city of Bombay and near Gadug. He writes: "Imagine great mines without hoisting machinery, the underground railway, or the throbbing steam pumps of today."

The workings were entered by crawling and climbing down narrow, inclined passages, over heaps of bats' dung, the accumulation of centuries; awesome with the beating of the wings of the living bats, and the rocks alive with cockroaches.

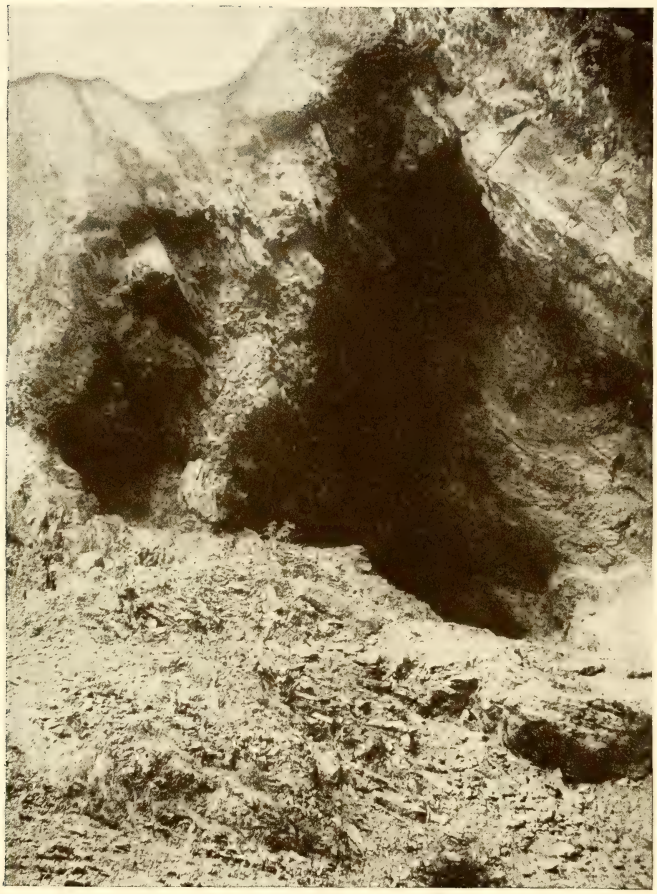
The walls of the excavations are worn smooth by the naked bodies of workers who labored under untold tyranny. The hoist and pumps were rows of humans that passed the water jars or baskets of ore from hand to hand.

These excavations reach a depth of over 200 feet (this is unusual, as the old mines are usually filled with water to within 40 or 50 feet of the surface), and are narrow, sloping tunnels that turn and twist in all directions as they follow the pay ore.

The rocks of the locality are granites, schists, and trap, but the relation of the ore to these rocks is not stated.

There is a smooth path of flagstones laid from the mines down the mountainside to the river bank, where the ore was crushed. The "mill" was described as follows:

Along the higher side of sloping bed-



ENTRANCE TO ANCIENT GOLD MINES IN INDIA

rock a trench was cut, into which water was fed and flowed into saucer-like depressions in the rock. These cups were the mortars in which the laborers ground the ore by hand, using pestles of stone.

As there were a hundred or more holes, it would seem that this "mill" was of a good capacity. This form of "mill" occurs in many places, and of them Mr. R. B. Foote, F. G. S., Superintendent of the Geological Survey of India says that "* * * the small mortars called 'Mullockers,' saucer-like hollows in the trappoid rock, are rather larger and deeper than half a cricket ball." He describes others as "* * * much larger, in which the ores were crushed by working rounded boulders, a half to one ton in weight, in them. These boulders must have been supported by some sort of frame-work."

It is believed by some persons that the mines near Gadug were worked about 2,000 years ago, and that they have been idle for at least 400 years. Of this subject Mr. Foote says: "The gold mining industry was considerable before the Mussulman invasions," and there are stories to the effect that these properties were looted of "tons of gold during the great wars"—a case where the past production is as fabulous and probably as truthful as many that are today predicted for some new properties.

GREELY'S "HANDBOOK OF ALASKA"*

THE American people, who are becoming very proud of our great northern territory, will welcome this valuable contribution by Major-General Greely to the literature of Alaska. Such a book has been long needed that would give a comprehensive, condensed, and graphic description of the enormous resources, wonderful scenery, and infinite possibilities of a region which is more than one-third greater than our Atlantic States extending from Maine to Florida combined. It is little more than one generation since Secretary Seward secured the territory for our national domain, but within this brief lapse of time Alaska has contributed to her owners three hundred and thirty-three millions of dollars of wealth in furs, gold, and fisheries. The yearly yield of products is nearly five times the price paid for "Seward's folly" in 1868, and yet the country is only on the threshold of development. General Greely's Handbook is particularly timely in view of the contemplated visit of the President to the territory this summer and of the Alaska-Yukon Exposition, which will be held during the next several months at Seattle.

No person is better equipped than the author by experience and travel to present the claims of Alaska to American recognition, for he has made six visits to Alaska, has thrice traversed the whole Yukon Valley, visiting Fairbanks and Prince William Sound twice and Nome three times. For a considerable period he exercised supreme military command over Alaska, and under his control and supervision was built the Alaskan Military Telegraph System of 4,500 miles of land lines, submarine cables, and wireless stations. The installation of these military lines for hundreds of miles through an untraversed and subarctic wilderness is one of the greatest achievements of our American soldiers.* The extent and importance of this telegraph service may be judged from the fact that the tariff on private telegrams now amounts to $250,000 annually, while Government telegrams represent at least $100,000 in tariff value.

In Chapter I General Greely shows how sharply Alaska differs in its geography from the United States. Its physical features include: Fiords of great depth of water confined by lofty precipitous cliffs and from twenty to one hundred miles in length; vast glacial fields, which are nowhere else equaled on the North American continent; volcanic ranges, with many peaks of fire and lava, stretching for one thousand miles from smoking Wrangell westward to Bogoslof, and immense frozen tundra regions, which are covered with a thick mat of vegetation, composed of mosses, lichen, shrubs, and some grass.

In Chapter III the author contradicts the general belief that the climate of Alaska is arctic in its character and in its severity. As General Greely rightly says, there is no typical Alaskan climate any more than there is a European or American climate. The extremes of latitude and longitude in Alaska find their parallel in Europe between Norway and Sicily and from western France to central Russia. It is interesting to note that the coldest month of the year at Sitka, 31.4 degrees, closely agrees with the coldest month of St. Louis, 31.6 degrees.

"The rigors of the past climate are strikingly illustrated by the great depths to which the ground is frozen. In the Nome region a shaft has been sunk 120 feet without reaching ground free from frost, and near Dawson the earth was found frozen to a depth of 200 feet."

Chapter IV describes the waterways, roads, and railroads. The river systems of Alaska afford approximately four thousand miles of navigable highways for steamers, nearly twenty-seven hundred being in the Yukon watershed. Congress, beginning with 1905, has been mak-

*Handbook of Alaska: Its resources, products, and attractions. By Major-General A. W. Greely, U. S. A. With maps and 25 full-page illustrations. New York, Charles Scribners Sons, 1909. $2.00.

*See NATIONAL GEOGRAPHIC MAGAZINE, 1904, pages 357-361, 490-494.

ing increasing appropriations for the construction of roads, appropriations to date amounting to $1,000,000. The most important road constructed follows the U. S. Signal Corps telegraph line from Valdez, which is open to shipping throughout the entire year, to Fairbanks, at the head of navigation on the Tanana River. General Greely states that practically the entire route of 385 miles "is settled, though sparsely, and road houses are situated at intervals of ten to twenty miles where most comfortable accommodations are found. Many of these enterprising proprietors have made homestead entries, are keeping stock, growing grain fodder, and raising vegetables, which are often abundant and excellent." Heavy freight can pass over the road in winter only, but in summer buckboard or light-wheeled vehicles can travel three-quarters of the distance.

The author gives an interesting description of the flagging of 500 miles of winter trails in the bleak and treeless tundra country of Seward Peninsula. Slight sticks, provided with red flannel flags, planted in the snow from fifty to one hundred yards apart, prevent the bewildered traveler from wandering from the trail and perishing in the winter blizzards.

Chapter VIII will be a revelation to those who think that the only vegetables found in Alaska are canned. "While the Seward Peninsula and the Arctic coast have no agricultural possibilities, yet considerable parts of the Yukon Basin are suitable for gardening to a degree astonishing to one uninformed. The best known instance of successful farming is that at the Holy Cross Mission on the Yukon, in 62° N. Here cattle have been raised for ten years or more and the products of the 40 acres of land under cultivation excite surprise in every visitor. At Coldfoot, within the Arctic Circle, potatoes, cabbages, turnips, rhubarb, etc., are grown of large size and good flavor. Truck gardening and hay farming are flourishing industries in the lower Tanana Valley, where it is claimed that 30,000 acres of land have been homesteaded." As the farmer gets $80 to $100 a ton for baled hay and potatoes bring from six to eight cents a pound, the successful Alaskan gardener makes more money than the miner.

In a chapter on mining the statement is made that the mineral output of the territory from 1880 to 1908 has been $148,000,000, of which $142,000,000 were in gold. Not far from 11,000 men are engaged in gold mining and prospecting. The coal deposits are extensive and of great value, covering a known area of 12,600 square miles. These coal lands were withdrawn from location by President Roosevelt in 1907 to prevent monopoly, and entries can now be made only in limited quantities. Realistic descriptions are given of the prosperous communities of Nome, Fairbanks, etc., and the assertion is made that the gold production of the Tanana Valley is far from having reached its maximum.

Equally instructive chapters describe the fisheries, the mountains, the inhabitants, the glaciers, and the game of Alaska. The salmon and cod fisheries alone have contributed harvests worth $92,000,000. Speaking of the introduction of reindeer into Alaska to prevent the extermination of the natives by starvation, General Greely says: "This action, inspired by Dr. Sheldon Jackson, promises in its results to be the most important benefit ever accorded the natives by the United States." Many of the big game are already nearly extinct. In 1907 only nineteen walrus hides were shipped out of Alaska, whereas ten years ago at least ten thousand walrus were annually killed in its waters. The game laws for Alaska, passed by Congress in 1908, it is believed, will afford some protection to game.

General Greely concludes the volume with useful tables, giving dates of historical interest, the mean temperature of various centers, the gold production by districts, the fur seal skins obtained from all waters of Alaska, the names of the glaciers, of the principal mountains and volcanoes, the value of the output of the salmon and cod fisheries, and the total products of Alaska classified from 1868 to 1908. G. H. G.

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE WORLD'S HIGHEST ALTITUDES AND FIRST ASCENTS

By Charles E. Fay, A. M., Litt. D.

President (1878, 1881, 1893, 1905) of the Appalachian Mountain Club
First President of the American Alpine Club

NO field of geographic exploration, not even the kindred one of polar quests, has proved so fascinating during the last half century as that of lofty mountains in the various quarters of our globe. Naturally, therefore, any attempt in a single article to more than outline our present knowledge of its highest altitudes and the manner in which this knowledge has been attained would prove disappointing.

That the lure of the heights is no new one comes home to whoever catches sight of Mr W. A. B. Coolidge's masterly work "*Josias Simler ou l'alpinisme depuis ses origines jusqu'en 1600,*" setting forth the history of mountaineering *previous* to the year 1600—a volume of a thousand pages! But modern mountaineering dates from nearly two centuries later—from the first ascent of Mont Blanc, in 1786—and for more than half a century ascents of importance were rare and confined almost exclusively to the Alps. Another epoch-making date was 1857, in which year was founded the English Alpine Club, destined to become the prototype of more than eight score similar organizations, represented in nearly every civilized land, societies whose leaders generally turned to "the playground of Europe" for the enjoyment of their chosen recreation. Hence it is not strange that in the next quarter of a century Switzerland and Tyrol had become hackneyed, with scarcely an important peak left unclimbed.

Probably there is no domain in which the element of pure sport has allied itself to so great an extent with a genuine spirit of scientific research to further human knowledge. The ice-world even of the Alps, with all its interesting problems of "the forms of water," glaciers and mountain meteorology, had been little known, save in general features, before the visitation of these men of leisure, in many of whom there existed a vigorous germ of that scientific curiosity which, coupled with the subtle primary appetite that the Germans call *wanderlust,* furnishes forth the true explorer.

We do not forget that famous naturalists, like Alexander von Humboldt and Sir Joseph Hooker, and certain enterprising surveyors had carried on their investigations in fields as grand and remote as the Andes and the Himalayas;

THE MOST FAMOUS OF MOUNTAINS, MOUNT ARARAT IN ARMENIA Photo by H. F. Reid

The peaks seen in the picture are Great Ararat (17,000 feet), and Little Ararat (13,000). They are about 7 miles apart and form the boundary of Russia, Persia, and Turkey, to each of which they partly belong

yet, lacking in technical skill as alpinists, they usually failed to reach and explore the loftier altitudes of the regions visited; and it was not until toward the close of the sixties of the last century that the pioneers of a more extended and intensive study of the mountain ranges of the world began to turn their attention to remoter fields.

In 1868 Messrs Freshfield, Tucker, and Moore, of the English Alpine Club, visited the Caucasus and made the first ascent of Elbruz (18,347) at the westerly and of Kasbek (16,546) at the easterly end of the great central chain. They may perhaps be regarded as the pioneers of a different type of mountain exploration and certainly as the revealers, if not discoverers, of a new "playground" on the confines of Europe and Asia, destined to witness in the last two decades of the century the coming of experts of different nationalities, who soon would leave, as in the Alps, no remote valley unvisited and no proud summit unvanquished.

THE GREATEST RANGES

A glance at the map of the world shows upon the several continents vast systems of mountain ranges or striking instances of isolated peaks. To note only the principal ones: we have here upon our Western Hemisphere that belt of varying width, which, rising to markedly different altitudes, extends from the Arctic Ocean to Cape Horn—a distance of hardly less than ten thousand miles. In Alaska it attains 18,100 feet in Mount Saint Elias, about 19,000 in Mount Logan, a comparatively near neighbor, and over 20,000 in Mount McKinley, some degrees nearer the Arctic Circle.* In South America, from the Equator southward, it soars yet higher in such giants as Chimborazo, Huascaran, Sorata, and Aconcagua. It is here that the Western Continent reaches its culminating altitudes.

* That no such lofty peaks as Mounts Brown and Hooker, respectively credited with altitudes of 15,900 and 16,980 feet, are to be found where geographies have for years located them in British America should now be known to all.

In Asia a similarly irregular, and much interrupted, chain runs in a general southeasterly direction from near the Black Sea. Beginning with the Caucasus and passing by way of the Elburz Mountains, several minor ranges, and the Hindu Kush to the mighty Himalayas, which for a distance of over twelve hundred miles form the northern frontier of India, it extends to the sources of the Brahmaputra and the Irawadi; great spurs like the Kuen Lun Mountains and the trans-Himalayan range, lately explored by Sven Hedin, strike eastward from it. This system has a reach of perhaps 4,000 miles, and in it (is it in Mount Everest, 29,002 feet, or some loftier peak, possibly once or twice caught sight of by men of the Occident ?) we have the crown of the world. Yet farther north, in central Asia, another notable range, very recently explored, must also be mentioned, for in it rise peaks of truly Himalayan proportions—the Tian-Shan Mountains, with Khan Tengri, some 23,600 feet in altitude.

Compared with these great systems, such limited regions as the European Alps sink into insignificance; and yet for inspiring grandeur and variety and beauty of form, also as a school for the art of climbing on crag and snows, these readily accessible peaks will always retain their prestige.

The vast continent of Africa presents no corresponding mountain system. The Atlas range in the north is of minor importance; for, while its summits surpass 13,000 feet, they are devoid of alpine features. Yet almost upon the Equator, east of the median line of the continent and in the neighborhood of the great lakes at the sources of the Nile, a complex of snowy peaks, Ruwenzori, and yet farther east and south isolated giants like Kenia and Kilimanjaro, rise to altitudes far surpassing Europe's long boasted "monarch of mountains." Mont Blanc measures 15,781 feet above the sea. Kenia is 18,620 feet; Kilimanjaro, 19,680, while nine of the chief summits of Ruwenzori measure between 15,800 and 16,815 feet.

The isles of the sea are not without their claimants for honor. If, in our extreme deference for crowns of snow, we pass by the Hawaiian volcano Mauna Kea (13,953), primate of the peaks of the Pacific, and Fuji-San (12,365), the sacred mountain of Japan, and its compeers, we shall find on the southern island of New Zealand, at a latitude of its hemisphere about that of our White Mountains of New England, a splendid range of glacier-bearing peaks, the Southern Alps, culminating in Mount Cook or Aorangi (12,349), a mighty pinnacle of rock and ice. On the island of New Guinea also there are mountains of even greater height, a peak of the Charles Louis range, in the Dutch dominions, being credited with an elevation of 16,730 feet.* In the Atlantic the Pico de Teyde, on the island of Teneriffe, lifts the summit of its graceful volcanic cone to 12,182 feet. Spitsbergen, in the Arctic, with its peaks rising 3,000 to 4,000 feet, one of which was climbed by Scoresby in 1818, has invited several able climbers since 1896.†

But most recent geographical news‡ presents the polar regions themselves as a field for alpinism. Peary, in his last expedition (1905), ascended a low peak (2,050), and now among the interesting details of Lieut. Shackleton's remarkable explorations in the Antarctic we hear of the discovery, in near proximity to the pole, of a lofty plateau upon which his party attained an altitude of 10,500, and inferred that the southern end of the axis of our planet is in this table land. How appropriate if it were a culminating peak of it! Pending such a revelation and the subsequent conquest of its summit, we can congratulate Professor David and his party, who, in connection with this expedition, scaled Mount Erebus (13,120) and brought interesting reports from its ancient crater.

* We note that a British expedition is now being fitted out to explore these mountains.

† First Crossing of Spitsbergen. Sir W. M. Conway. London, Dent & Co., 1897.

‡ Nature, March 25, 1909.

FIRST ASCENTS

Having presented a rough sketch of the world-wide field, let us seek to furnish somewhat more in detail a register of the notable ascents accomplished in these different regions, keeping so far as may be to the chronological order of their exploration, and endeavoring to give proper credit, if not always, by reason of the embarrassing wealth of material, to individuals, at least to the nationalities represented.

To the average reader, unfamiliar with the climber's craft, mere altitude is likely to be the impressive fact in a comparative appreciation of the difficulty and danger of mountain ascents; yet a table of heights by no means conveys adequate information upon these points. Aside from the serious hardship occasioned to nearly all persons at great altitudes, apparently by the diminished quantity of oxygen, even the loftiest summits might prove of comparatively easy access, once the base were reached. Judging from its outline and snows, as shown in Signor Sella's telephotographic view of the peak from the Chunjerma Pass, Mount Everest itself would be set down as an easy mountain; that is, as offering no serious technical difficulties to the skilled climber. Mont Blanc was first climbed by an untrained Chamonix peasant, alone, in a two days' trip. For difficulty and danger, this monarch of the Alps is far surpassed by many lesser peaks—nay, by several of the *aiguilles* (needles) of its own neighborhood—the Blaitière, Grands Charmoz, Dru, Grépon, and Dames Anglaises; yet these crags are only from 11,300 to 12,300 feet high, with their bases high up on the outreaching spurs of the great white mountain.

It was as late as 1901, seven years after his remarkable campaign in which he had accomplished in one month eight*

*Aiguille du Moine (11,198), Aiguille des Charmoz (11,293), Petit Dru (12,245), Aiguille de Grépon (11,447), Dent Blanche (14,318), Zinal Rothorn (13,856), two peaks of Monte Rosa (15,217 and 14,965), and the most difficult of the ascents of the Matterhorn (14,782), that over the Zmutt arête.

THE CROWN OF THE WORLD—THE HIGHEST PEAK KNOWN—MOUNT EVEREST, 29,002 FEET

From a telephotograph by Vittorio Sella, taken from Chunjerma Pass (Nepal), about 80 miles distant

THE SUMMIT OF JANNOO IN THE HIMALAYAS, 25,000 FEET HIGH Telephoto by Vittorio Sella

of the most difficult climbing feats of the Alps, four years after his conquest of Mount Saint Elias, and the year following his notable success in securing the "Farthest North" for his polar expedition, that Prince Luigi of Savoy made the first ascent of the second in height of the Dames Anglaises and christened it "Yolanda Peak." Later he made the first ascent of the Aiguille Sans Nom. It was with climbs of this type in mind that the historiographer of the Alaskan expedition could say concerning this ascent of Mount Saint Elias, whose conquest required nearly forty days' journey over glaciers and névé nearly the entire distance from the shore of an inhospitable sea to the altitude of 18,100 feet, that "if the winning of Saint Elias only meant the ascent of the terminal cone . . . it might be compared with many of the easier climbs in our own Alps."

In determining, then, from a consideration of hardship and sacrifice, what comparative credit shall be accorded to those who bring to us the knowledge of the world's mysterious heights, we must consider not only the inherent difficulties offered by the type of mountain ascended, but its remoteness from civilization; the character of the country to be traversed in reaching its base; the height of snow-line; the climate, whether temperate or affording such contrasts as those reported by Doctor and Mrs Workman on the occasion of their recent climbing (1906) in the Nun Kun Himalayas, where, at an altitude of over 21,300 feet, the mercury in the tube of the solar thermometer fell from 193 F. to 4 degrees below zero within fifteen hours, or amid such comfortless surroundings as those of Doctor Cook and his single companion, passing the last night of their four days' ascent of Mount McKinley in a cavity stamped out in the steep snow slope, with a thermometric reading of 11° below zero. Then there are such dangers as the risks from savage or ill-disposed natives, as in some of the valleys of the Caucasus and beyond the English sphere of influence in the Himalayas, or insidious fever and the deadly "sleeping sickness" of the forests of Equatorial Africa, to say nothing of the vexatious problems arising from the necessities of transportation of supplies by undisciplined porters. Considering these things, even the ascents of very lofty summits that look down upon considerable towns, affording many "creature comforts," that lie nestled at their already lofty bases, and where vicariously panting mules may bear one comfortably to the soaring snow-line, seem to call for a less strenuous type of explorer. This we set down, not that we esteem such labors less, but the others more.

To one who has kept in touch with the increasing volume of alpine literature during the past three decades, it has been interesting to note in how brief a time strange and outlandish names come to have a familiar sound and acquire the power to summon before the mental vision some superb "mountain majesty." This latter satisfaction is due to the fortunate circumstance that the development of photography and the modern arts of reproduction from photographs occurred coincidently with this entrance of man upon new and glorious scenes. Hence the magnificent illustrations, that speak far more eloquently than any human pen, which make many of the voluminous works that describe the newly visited regions works of the highest art.

THE CAUCASUS

All this is particularly true of the Caucasus. To Elbruz and Kasbek, which summed our earlier total of local nomenclature, there was suddenly added the names of a whole series of supremely beautiful glacier-bearing peaks: Dychtau (17,054), Shkara (17,038), Koshtantau (16,880), Janga (16,569), Tetnuld (15,918), Ushba (15,400), and Adai Khokh (15,244). These are the giants of the central group. Mr Freshfield tells us that "in a space some ten miles square . . . are to be found not less than twenty distinct summits of over 14,000 feet." And the chief of these were climbed between the years 1884-1895 by English, Hungarian, and German alpinists.

Some of the names of the victors recur several times in the annals of conquest. We have named the pioneers of 1868, members of the Alpine Club. Moore, of that party, returned with F. C. Grove and others of the club in 1874, and scaled with them the western, slightly higher, of the twin domes of Elbruz (18,470), like its fellow an easy mountain. Déchy, a Hungarian alpinist and expert photographer, came first in 1884, then in the three following years, devoting his efforts rather to the glaciers and passes than to the high summits, and procuring the remarkable views that adorn his recently published volumes.* Dent came again with Donkin in 1886 and climbed Gestola (15,932). They both returned in 1888 with Fox added to their party. A fortunate indisposition detained Dent, while Fox and Donkin went on to climb Dongosorun (14,547), and then to attack the stronghold of Koshtantau. Here they and their guide perished; just how we shall never know. To solve the sad mystery Dent returned a year later with Freshfield, H. Wooley, the present president of the Alpine Club, and others, and found high up on the grand peak the last bivouac of their lost associates. Wooley succeeded in scaling the fateful summit. It was in 1889 and 1890 that Signor Sella made his visits, combining, like Déchy, photography with exploration, yet ascending more peaks, and securing that superb collection of views later used in collaboration with Mr Freshfield.†

Doubtless the most impressive of all the Caucasian giants in its aspiring grandeur is the double-towered Ushba, so stationed on the watershed of two continents that one of its peaks is in Europe, the other in Asia. The former was climbed in 1888 by Mr Cockin (A. C.), who that same year vanquished Shkara and Janga, and later, in 1890, Adai-Khokh and two other high peaks, in 1893 yet others, but in 1895 was foiled in his attempt on the southern tower of Ushba. This was secured in 1903, after a repulse that nearly cost him his life, by Herr A. Schulze with others.*

Germany was also represented as early as 1891 by Herren Purtscheller and Merzbacher, of whom the former had climbed Kilimanjaro in 1887, and the latter was to distinguish himself as a pioneer in the Tian-Shan Mountains.

NEW ZEALAND ALPS

If the keen interest that had attended the continued revelations from this semi-adjacent region of the Caucasus was beginning to wane at the end of the eighties, new matter came pouring in from various quarters to whet the appetite for alpine grandeurs. The Rev. W. S. Green (A. C.) had visited New Zealand in 1882† and ascended Mount Cook (Aorangi), which attains an altitude of 12,349 feet. A pioneer there at the antipodes, stimulating the ambition of the young men of that new country and exciting other emulation nearer home, he shortly directed his steps to the freshly opened mountain region of British Columbia, and here, too, became the forerunner of a new generation of alpinists, bringing out the first mountaineering book for this new Switzerland.‡

A New Zealand Alpine Club was formed in 1891, and not only its own periodical but also the pages of the *Alpine Journal* have since brought out numerous articles descriptive of the noble scenery and stirring adventures among these Southern Alps. Of its members one of the most active has been Mr G. E. Mannering, author of "With Axe and Rope in the New Zealand Alps" (Longmans, 1891). Doubtless the most exciting of the works§ that deal with this region is that of Mr E. A. Fitzgerald (destined later to be heard from in an-

* Kaukasus, 3 vols., Berlin, D. Riemer, 1905.

† The Exploration of the Caucasus, 2 vols. Arnold, London & New York, 1896.

* For a most spirited description, see article by W. R. Rickmers, "Personally conducted: Suanetia in 1903," Alpine Journal, Nos. 166, 167.

† The High Alps of New Zealand (Macmillan, 1883).

‡ Among the Selkirk Glaciers (Macmillan, 1890).

§ Climbs in the New Zealand Alps (Scribners, 1896).

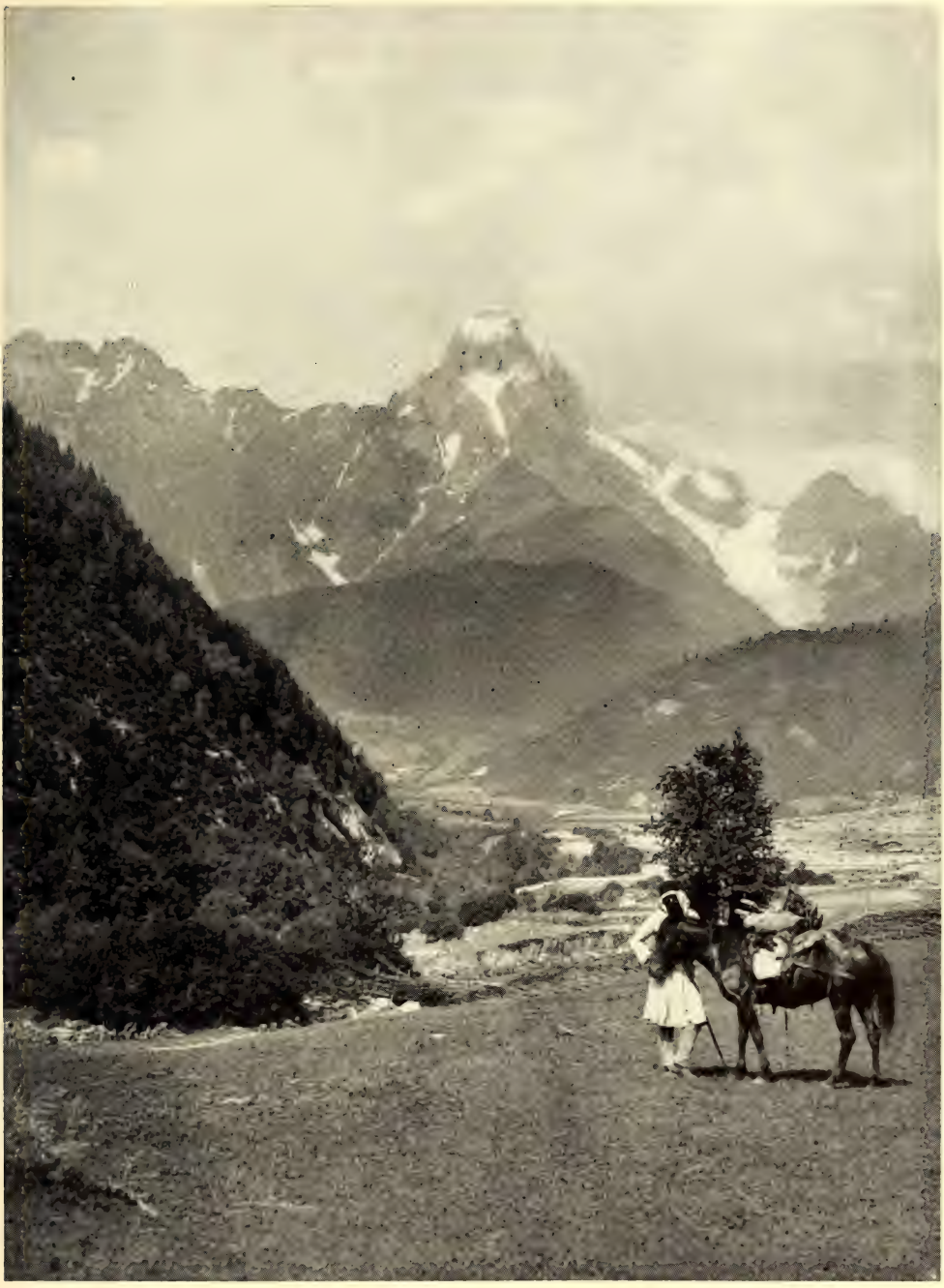


Photo by Vittorio Sella

THE MOST IMPRESSIVE OF ALL CAUCASIAN GIANTS, USHBA, ONE OF WHOSE PEAKS IS IN EUROPE AND ONE IN ASIA

IN THE SOUTHERN ALPS OF NEW ZEALAND

other quarter), who in 1895 made several brilliant ascents, including the Silverhorn, Sefton, and Cook. Among the episodes, the story of his slip on Sefton and hanging in mid-air supported only by the rope in the hands of Zurbriggen, himself but insecurely placed, is one of the sort calculated to make the heart, even of the experienced climber, stand still.

Before touching upon that other region where Green must be regarded as the pioneer, let us note what was going on at about the same time among peaks that for combined altitude and inaccessibility hold the primacy of the world.

THE HIMALAYAS

The stupendous character of this range almost baffles our imagination. Aided by Sella's matchless photographs, we come to appreciate the sublimity of its individual peaks, but how comprehend their multitude? From the Sikkim Himalayas to the Karakorams, say from Kangchenjunga to K_2, the air-line distance is approximately that from Washington to Saint Paul, nearly all the way guarded by those giant watch-towers. The Garhwal district, with Nanda Devi (25,689), Trisul (23,406), and other notable peaks recently come into special prominence, is about midway of these extremes. It is in these three sections that the principal explorations of alpinists have been made.

High ascents in the interest of science began here comparatively early. The brothers Schlagintweit, German naturalists, who conducted investigations (1854-57), in all these regions, unlike most purely scientific travelers, had had experience in the first ascent (except by guides) of the Grenzgipfel of Monte Rosa in 1851, aided by which they attained here an altitude long unsurpassed. There is a presumption approaching probability that the late W. H. Johnson, a surveyor of the Government Topographical Survey, reached in 1865 a record that has never been much exceeded (23,890 feet) on E 61 of the Kuen Lun range.

The more recent work of skilled alpinists began with Mr W. W. Graham's visit in 1883. After two ascents to above 22,500 feet in the Garhwal, he made his famous assault on Kabru (24,015) in the Sikkim region, the nearest neighbor westerly from Kangchenjunga. His report of this ascent was made at a meeting of the Royal Geographical Society and printed in its Proceedings.* It reads like the story of an honest man, and no one doubts that he was an experienced climber. Received with flattering approval at this meeting, his story was shortly attacked as improbable, principally from the absence of the customary allusions to mountain sickness. From that time there have existed two camps with regard to Graham's accomplishment. It must be confessed that the competency of his supporters, joined with recent testimony, creates a very strong presumption in his favor.

Nine years later (1892) Sir Martin Conway undertook an expedition to the great glaciers of the Karakoram range, and in a grand tour, during which he passed eighty-four days on ice and snow, he explored the Hispar, Biafo, and Baltoro glaciers and climbed, among others, Crystal (19,400) and Pioneer (23,000) peaks. Major Bruce, of the British army, who was a member of Sir Martin Conway's party, continued his climbing for several seasons thereafter in various sections of the Himalayas, traversing new passes and climbing virgin summits, and was a member of the party of Doctor Longstaff in 1907, of which more directly.

In 1895 two of England's most famous mountaineers, Mr A. F. Mummery and Professor J. N. Collie, both expert cragsmen who, among other prowesses, had traversed the audacious route by the Zmutt arête to the summit of the Matterhorn, made an expedition to Kashmere, having especially in view the ascent of Nanga Parbat (26,629), a peak not yielding in majesty, nor perhaps difficulty, to any of its few superiors in actual altitude. In their reconnoissances they ascended the beautiful Daimirai Peak (19,000), and Mummery reached a point on the

* Vol. VI, August, 1884.

principal mountain over 20,000 feet. A few days later, with two natives with whom he had started to study another side of the mountain for a more feasible route, he perished in some unknown manner.*

It was in 1898 that Doctor and Mrs W. H. Workman, of Worcester, Massachusetts, began the series of excursions that have placed their names among the very highest on the roll of Himalayan explorers. That year they traversed several high passes; the following, they reached Hispar Pass and climbed the Siegfried Horn (18,600), Mount Bullock-Workman (19,450), and Koser Gunge (21,000). In 1902 they explored the Chogo-Lungma Glacier and three of its principal branches, climbing also several secondary peaks; in 1903 they explored the Hoh Lumba and Sosbon glaciers to their sources and made first ascents of Mount Chogo (21,500) and Mount Lungma (22,568); in 1906 they made the first exploration of the Nun Kun range, in which expedition Mrs Bullock-Workman reached the summit of Pinnacle Peak (23,300); they also climbed in this year Mount Nieves Penitentes (19,080) and D_1 (20,571). During the season of 1908 they successfully completed a detailed survey of the Hunza-Nagar and Hispar glaciers. From a camp at over 19,000 feet, near the Hispar Pass, they climbed a "very abrupt knife-edge slant of over 2,000 feet; the height of the mountain will probably work out between 21,000 and 22,000 feet."

A notable excursion was made in 1899 by Messrs Freshfield and Garwood and Signor Sella entirely around the principal group of the Sikkim Himalayas, between the Teesta and Zemu rivers on the east and the Kangbachen torrent on the west, crossing the Jonsong-La (20,348), the story of which, illustrated by Sella's marvelous pictures, is told by Mr Freshfield in his "Around Kangchenjunga" (Arnold, London, 1903).

* See Climbing on the Himalaya and other Mountain Ranges, by J. N. Collie. Edinburgh, Douglas, 1902.

And finally we record the two events that gave a distinction to the year 1907, the jubilee year of the Alpine Club; the ascent, by Dr T. G. Longstaff, of Trisul (23,406), in the Garhwal, in which he made the remarkable speed-record (for such altitudes) of 6,000 feet in ten hours; and the ascent of Kabru (24,015), a "guideless climb" by two Norwegians,* C. W. Rubenson and Monrad-Aas, who disclaim "the distinction of being expert mountaineers," and, if we may take their word for it, are more pleased at the fact that they spent "twelve or thirteen days at a height of 19,500 feet and higher" than with holding the unchallenged record for farthest up. Their highest camp was at 22,600 feet, the loftiest elevation at which man has passed the night. They complain but little of the effects of rarefied air, and their feat would seem to remove every shade of improbability from the claim of the experienced Graham, who was accompanied in his climbs by one of the best Swiss guides of his day.

IN AMERICA

Returning now to the Western Continent, it may be in order to say a few words concerning the development of mountaineering as a sport on this side of the Atlantic.

That the proper temperament exists here is shown by the popularity of mountain clubs, the first of which, the so-called "Alpine Club" of Williamstown, Massachusetts, borrowed its name from its more distinguished predecessor as early as 1863, only seven years after the founding of the mother club so prolific in progeny. It, in turn, was the forerunner of the Appalachian Mountain Club (1876), which has at present some 1,600 members. This society has flourished in a region possessing no mountains that can lay the slightest claim to alpine characteristics, unless it be in the depth of a rigorous New England winter, when the broad-backed ridges of the Mount Washington range (4,000–6,300) simulate with

* See article "Kabru," by C. W. Rubenson, in Alpine Journal (182) for November, 1908.

Telephoto by Vittorio Sella

THE CREST OF SINIOLCHUM IN THE HIMALAYAS, 23,000 FEET

Regarded by connoisseurs as the most beautiful of snow peaks

KANGCHENJUNGA, 28,150 FEET, THIRD IN ALTITUDE OF THE HIMALAYAS

Photo by Vittorio Sella

The view on page 507 is taken from a point near the +

KANGCHENJUNGA FROM GUICHA LA (PASS), 16,430 FEET

Photo by Vittorio Sella

AMONG THE SMOOTH, BARE GRANITE CLIFFS OF THE SIERRAS ABOVE TIMBER-LINE Photo by G. K. Gilbert

their blanket of ice and snow the loftier summits of true alpine domes. Yet better evidence of our vocation is the distinction won by our fellow-countrymen and countrywomen in the most noteworthy climbing. Most of these eminent climbers are enrolled in the American Alpine Club (1902), a society of limited membership.

The Far West, and especially the Pacific slope of our continent, offers a much better field; yet even here, at least in the United States proper, distinctly alpine features are for the greater part absent. That vigorous societies have arisen here is not strange: the Sierra Club in San Francisco (1892) and the Mazamas (1894) in Portland, Oregon. The former finds a grand field for rock climbing in the High Sierra; the latter makes exhilarating and inspiring snow excursions to the summits of the extinct volcanoes of the Cascade Range. These beautiful snow-covered domes, Shasta (14,440), Hood (11,225), Saint Helens (10,000), Adams (12,470), and Rainier (14,394), present no serious technical difficulties, as may be judged from the fact that large parties of thirty to forty, of both sexes, not infrequently make their summits. This is not true of Mount Baker (10,827), which a selected party of Mazamas found almost beyond their powers in 1907. Moreover, the first ascent of Rainier in 1876 by General Hazard Stevens and his companion, both untrained in alpinism, was a noteworthy climb.

The first American work on mountaineering was Clarence King's finely told story of climbs in California, undertaken in the service of the State Geological Survey.*

The story grows exciting as the heroes cross some fearfully narrow arête; yet bolder climbs have been made since, until nearly every important peak has been scaled. Mount Ritter (13,156) was ascended by John Muir in the early seventies; Mount Whitney (14,499), the highest summit in the United States proper, by Bengole, Lucas, and Johnson in 1873, and Mount Abbott (13,700), whose "forbidding summit . . . is one of the only two great Sierra peaks which has not yet been ascended," (so wrote Professor J. N. Le Conte in 1907,*) was conquered in 1908 by that leading authority on the Sierra Nevada, to whose camera we owe our picture of its precipitous upper slopes.

While ascents in the Rocky Mountains, at least south of Montana, lack in interest, owing to the fact that even the most repellent summits usually have a very simple way of access, nevertheless the ascent of the Grand Teton (13,800) in Wyoming, made by Messrs Langford and Stevenson in 1872, counts among the most notable climbs of the early days, and there are doubtless some fine rock climbs yet to be made in the less-visited Sangre de Cristo Range, and perhaps in the Elk Mountains of Colorado.

The volcanoes of Mexico deserve mention less for their difficulty than for their altitude, since Ixtaccihuatl (16,500), Popocatepetl (17,660), and Orizaba (18,240) count among the highest peaks of North America. As with most mountains of their class, the demand is principally upon lungs and legs, the use of hands not necessarily entering into the problem, and each of the party may wander "at his sweet will." There being a sulphur mine at the crater of Popocatepetl, ascents may be assumed to be somewhat frequent. The "White Lady" of the more unpronounceable name is less accessible.† In the case of all these peaks it is of course difficult to say *quis primus*.

THE CANADIAN ALPS

It was with the opening of the Canadian Pacific Railway that a true American Switzerland was made accessible and a

* Mountaineering in the Sierra Nevada. Boston, Osgood & Co., 1864. New edition. Scribners, 1901.

* Alpina Americana No. 1, The High Sierras of California, Philadelphia, 1907.

† An interesting account of a recent ascent made by Mr Charles A. Gilchrist (A. A. C.), of Philadelphia, may be found in Appalachia, Vol. X. Ascents of Popocatepetl and Orizaba, by A. E. Douglass and W. A. Cogshall, were described in Vol. VIII of the same journal.

new era began for cis-Atlantic alpinism. Though rising but from 9,000 to 12,500 feet above sea-level, the highest summits spring from 5,000 to 8,000 above their bases, which, after all, for the climber is the true criterion of height. They bear extensive glaciers with intricate ice-falls and, with their manifold architecture, present every variety of climbing to be found in the Swiss Alps. Mr Green's visit of 1888, to which we have referred, was followed two years later by that of Herren E. Huber and C. Sulzer, of the Swiss Alpine Club. Mr H. W. Topham, of the English club, was also on the ground. Their excursions were confined to the Selkirks, where interest first centered. Huber and Sulzer together climbed Sir Donald (10,808), Sulzer took in Swiss Peak (10,515), and Huber and Topham Purity (10,457) and other peaks beyond the Asulkan Pass. Like Green, they brought no guides and depended for porters on what the country had to furnish.

Two recently graduated Yale men, S. E. S. Allen and W. D. Wilcox, then became interested in the more easterly range of the Canadian Rockies, and as early as 1903 began their series of visits, in which they explored several of the less-known valleys, climbing in 1904 Mount Temple (11,626), the ponderous and impressive mass towering above Laggan. Mr Wilcox is an expert photographer, and the beautiful results of his camera illustrate his two books on that region.*

In 1905 a delegation of three members of the Appalachian Mountain Club—Abbott, Fay, and Thompson—made their first serious attack on these peaks, capturing Mount Hector (11,125) in the Rockies, and Castor and several minor peaks in the Selkirks, reconnoitering also for the ascent of Mount Lefroy (11,220). Joined by Professor Little, in 1906 they returned. Three of the party captured Mount Rogers (10,536), and then the four proceeded to renew the attack on Lefroy. In this attempt the valuable life of Abbott was sacrificed. This was in the days before the coming of expert guides.

In 1907 an Anglo-American party of nine, with the Swiss guide Peter Sarbach, brought over by the British members, made the successful ascent of Lefroy. Two days later three of the company and the guide made Victoria (11,355), and some days thereafter Mount Gordon (10,336) was climbed by the entire party. In the number were men who had climbed in many lands, among them Professor Collie, of the ill-starred expedition to Nanga Parbat. In the climb of Mount Gordon a noble mountain was sighted, and as a memorial to his lost companion named Mount Mummery (10,908).

That Collie found here a region answering all demands was proven by his repeated visits, during which he explored a wider field than most of his contemporaries, ascending, among other peaks, Athabasca (11,900), Freshfield (10,900), Forbes (12,075), The Dome (11,650), Diadem Peak (11,500), and Murchison (11,100).* It was he also who first called attention to Mount Columbia (12,740), the highest conquered summit of the Canadian Alps, the unsuccessful goal of his second visit. In two of his expeditions he was accompanied by H. Wooley, of Caucasian fame. Doctor Collie's expeditions are interestingly narrated in the book already referred to and a later publication.†

The year 1907 also brought hither the late Herr Jean Habel, fresh from explorations at the base of Aconcagua, who in this visit discovered and revealed the beauties of the now well-known Yoho Valley, and in 1901 pushed his explorations northward to the base of Mount Columbia. Our picture of this beautiful pyramid is from his camera.

In 1899 Parker and Fay, with the Swiss guides Häsler and Feuz, made the summit of Mount Dawson (11,113), one of the highest of the Selkirk range.

*Camping in the Canadian Rockies, 1896 (Putnam); The Rockies of Canada, 1900 (id.).

* This series of altitudes is approximate.

† Climbs and Explorations in the Canadian Rockies, by J. N. Collie and H. Stutfield, Longmans, 1903.

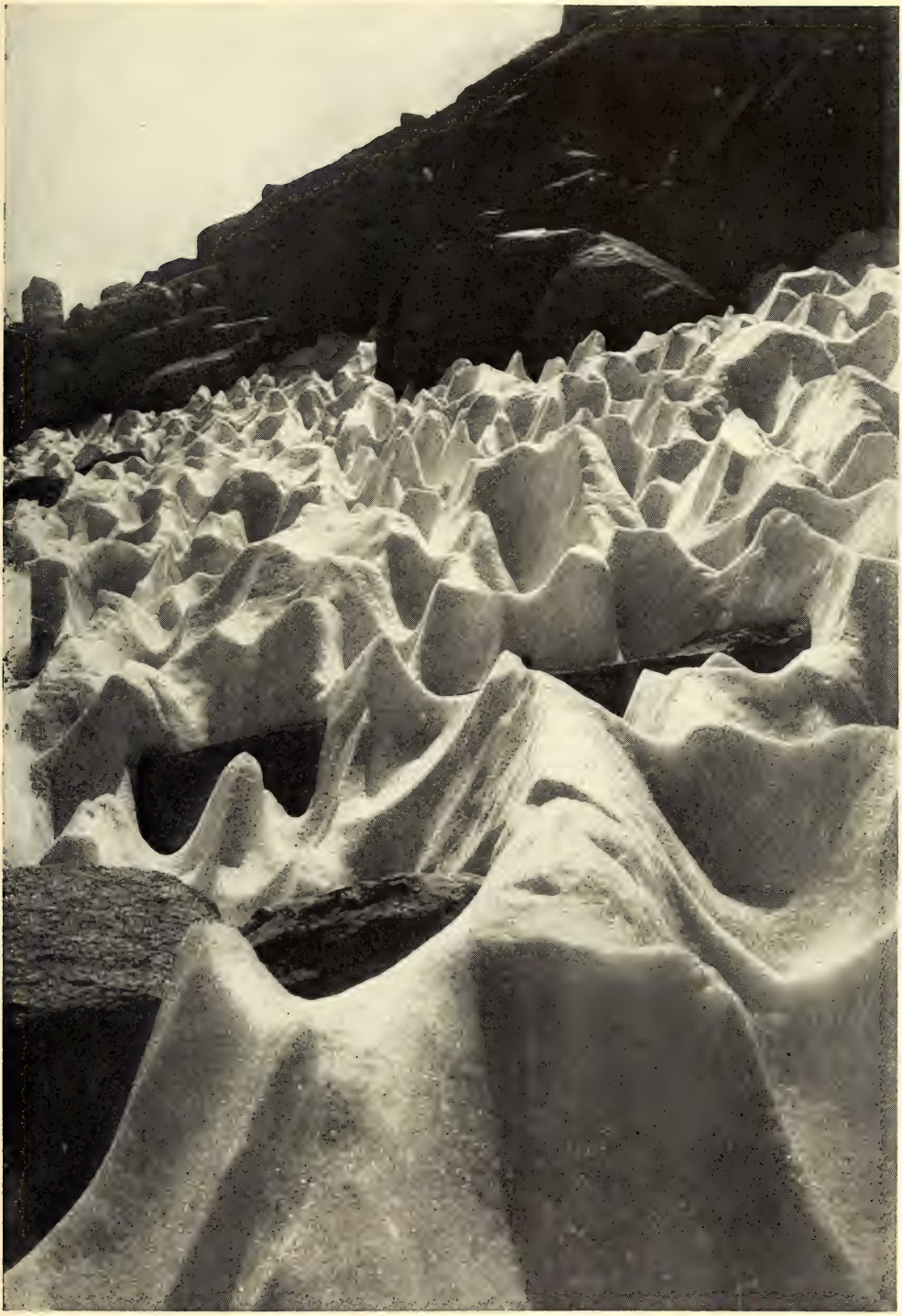


Photo by G. K. Gilbert

A WASTING SNOWDRIFT IN THE SIERRAS

Photo by Walter D. Wilcox

A CANADIAN MATTERHORN, MOUNT ASSINIBOINE

Nearly 12,000 feet high; first ascended by James Outram in 1901

The year 1901 saw the first of a series of visits from Edward Whymper, the conqueror of the Matterhorn and Chimborazo. Though he made no ascents of the first order, he was by no means idle, visiting many heights and some secluded valleys, collecting much interesting data. That year also brought for the second time another British climber, of a very strenuous type, whose appetite had only been whetted by a hasty visit in 1900. Mr James Outram's record is not likely soon to be surpassed. It includes for 1901 Cathedral (10,454), Assiniboine (11,860), Vaux (10,881), and the Chancellor (10,751), the last two with companions. In 1902, in a single campaign, with only the guide Christian Kaufmann, he secured the summit of Alexandra (11,650c.), Bryce (11,686), Lyell (11,950), and Columbia (12,750), and in conjunction with Collie's party, Mount Forbes (12,075).

The principal victories of 1903 were won by climbers from the United States, Parker and Fay securing the south peak of Mount Goodsir (11,676), which asserts some claim (until a more accurate measurement is made of Mount Assiniboine) to be the highest Canadian peak south of the railway. Later Parker and Eggers conquered Hungabee (11,447), Deltaform (11,225), and Biddle (10,500), three of the most forbidding peaks of the Canadian Alps.

In 1906 our cousins beyond the boundary became impressed with the long neglect of their splendid opportunity and formed the Alpine Club of Canada, which has made a phenomenal growth under the presidency of A. O. Wheeler, Esq., the government topographer for that region, who, as likewise his professional associates, has a long list of first ascents to his credit.

THE TIAN SHAN RANGE

Contemporaneously with the most active work in the Canadian Alps, the first survey was being made in a little-heard-of-range of gigantic snow peaks—the Tian-Shan range, in the very heart of Asia—by Herr Merzbacher, whose name we have already mentioned in connection with the Caucasus. Recognizing the absolute necessity of an alpine equipment, he took with him expert guides, and in the course of his explorations climbed several peaks between 13,000 and 17,000 feet and passed around the *massif* of Khan-Tengri (23,600 c.). As this peak is almost exactly on the same parallel as Boston, one may judge that it towers far above the line of perpetual snow. The peculiarly dry powdery character of the snow at the higher levels rendered progress very difficult and dangerous, exciting serious doubts as to the possibility of ever reaching the highest summits.

THE ANDES

It was in the late nineties also that attention was called afresh to the Andes, where in 1879-80 Mr Edward Whymper the first to climb the Matterhorn (1865) and to produce a true classic on mountaineering, had won new fame. Mount Chimborazo (20,498) was his chief objective point, and his confessed motive to investigate the effect of high altitudes upon the human organism. Humboldt in 1802 had ascended to above 19,000 feet, just to the place where some knowledge of the climber's craft was requisite for further advance. A generation later, in 1831, the French naturalist, Boussingault, had reached apparently the same turning point. Carefully making his preparations, accompanied by his favorite guide, Carrel, and a Swiss porter, Mr Whymper betook himself to the high table-land of Ecuador. In the course of his expedition he ascended, measured, and mapped not only Chimborazo, but also the active volcano Cotopaxi (19,613), Antisana (19,335), Cayamba (19,186), and several other peaks over 15,000 feet high. Employing his unusual powers of critical observation in many directions and bringing home data from various fields, he published the results in a notable work,* which stands as an unsurpassed model of its class.

* Travel among the High Andes of the Equator, 2 vols. London, John Murray, 1892.

Lofty as are these equatorial colossi, still greater peaks of undetermined height were known to exist further south, and it was to these the alpinists from different lands now began to turn their steps. Here the names of E. A. Fitzgerald and Sir Martin Conway acquired new distinction. In 1897 the former assaulted Aconcagua (23,080), the generally conceded culmination of the system. Though personally compelled by sickness to desist from each of his efforts to reach the summit, nevertheless members of his party, Mr S. Vines and the guide Zurbriggen, accomplished the ascent. Later Fitzgerald, with companions, climbed Tupungato (21,550). In 1898 Conway captured Illimani (21,192) and made a speedy second ascent of Aconcagua, but was turned back on Illampu (Sorata) when within, as he estimated, some 250 feet of the summit. Doubtful of the correctness of the accepted measurement of this peak (24,812 feet, according to the Bolivian survey), even though his own barometric determination plus his estimate came out but a few hundred feet less, he made a careful trigonometric survey, which resulted in lowering the peak to 21,700 feet!

Meanwhile a woman of our own nation was making her practice climbs in the Swiss and Tyrolese Alps and in Mexico, in preparation for bold attempts upon these much-talked-of giants of the Andes. First in 1903, accompanied by two Swiss guides and a scientific assistant, she attacked Mount Sorata, but was compelled to retire discomfited. Returning the following year, this time without guides, and hence compelled to take as her companion a gentleman of quite limited alpine experience found on the spot, she pluckily went forward and from a camp at 18,100 feet attained an elevation estimated at "approximately 20,500 feet, probably within 600 or 800 feet of the summit." Becoming persuaded that Mount Huascaran (Huascan), in Peru, was actually the highest peak of the Andes, to attempt this she returned to South America in 1906, again without guides and again to meet with failure. Undaunted still, and able this time to associate in her enterprise the aid that even the most expert alpinists regard as indispensable, she made another attempt in 1908, in which her long and persevering efforts were crowned with success. It is to be regretted that she secured no hypsometric reading at the summit of Huascaran, which is not generally recognized as holding so prominent a place as Miss Peck accords to it—"estimated 23,800–24,000 feet and perhaps higher." Instructed by Sir Martin Conway's test of Illampu, all mountain lovers will await with interest a scientific determination of the altitude of this grand peak, meanwhile according Miss Peck a very high place among those who have attained the loftiest altitudes and the first prize for persistence and energy.

ALASKA

Allusion has already been made to the conquest of Mount Saint Elias by the Duke of the Abruzzi, which occurred in 1897—the same year with the first ascent of Aconcagua. Between 1886 and 1891 four serious attempts had already been made to scale this peak, with varying degrees of insuccess. Its remoteness from civilization in a sub-arctic waste, its whole altitude practically above snow-line, made it an inviting substitute for an Himalayan goal when the breaking out of the plague in India turned the mind of the young explorer from a proposed attempt in that section. Less as an ascent difficult *per se* than as a most skillfully arranged campaign, and as a training school for its leader in preparation for the arctic expedition which shortly was to win for Italy the temporary record for "Farthest North," does this ascent take a place among the most important. The story is told so fully by Doctor De Filippi in his interesting narrative* that it is unnecessary even to outline it here. We cannot, however, forbear to remark upon the graceful recognition accorded to the remarkable work of Professor I. C. Russell, of the University of Michigan, who in 1890, and again in 1891, though prac-

* The Ascent of Mount Saint Elias. Westminster, A. Constable & Co., 1900.

Photo and copyright by Annie S. Peck

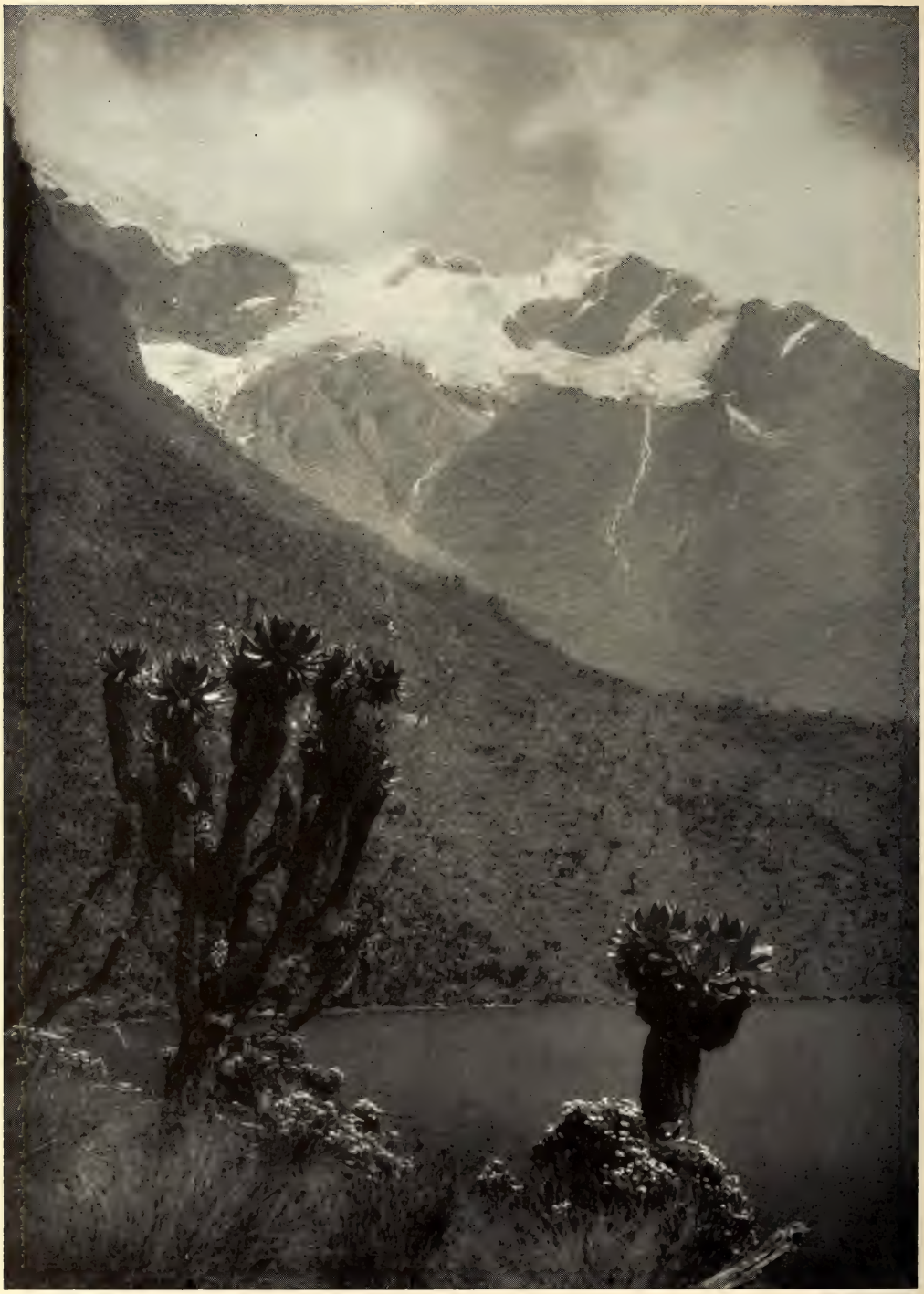
HUASCARAN, PERUVIAN ANDES, FROM AN ELEVATION OF ABOUT 10,000 FEET

tically untrained in alpinism and without guides, had pushed forward almost to within reach of the prize, camping finally at the high point where the Italians passed their last night before success and to which they later gave the name of Russell Col. This climb of Russell would still rank as the most daring feat of American mountaineering had it not recently been surpassed upon a peak yet farther north.

This distinction must, we believe, be accorded to the ascent of Mount McKinley by Dr Frederick A. Cook, of Brooklyn, with a single companion, in 1906. The details are thus summarized in *Appalachia*, though the narrative is given in full by the author in his "To the Top of the Continent."

"A mountain near to the Arctic Circle rising to an elevation of over 20,000 feet, nearly its entire mass above the snow-line of its region; a wild and difficultly accessible region this, approachable along glacial rivers by a novel accessory for mountaineering, the steam launch, and by pack train under unusual disabilities; two failures to find a line of ascent, compelling the party to desist from present effort and tantamount to the postponement of the enterprise to another year; then a party of three men set out for surveying purposes, bearing on their backs their entire outfit for a fortnight: provisions, camp, clothing, and liquid fuel for high altitudes; this reconnaissance brings them to the summit of a subordinate ridge, from which a natural route to the summit seems open; two of the party attempt it; neither is trained in alpine climbing, though the leader is experienced in arctic work; to this they trust, and with dogged persistence, living upon pemmican, dispensing with fire save for tea-making, they toil upward for four days, now building an Esquimaux igloo for the night where a level space will permit, again digging a cavity on the side of a precipitous snow slope and enduring the rigors of the arctic cold, protected only by their sleeping bags—and the Providence that stayed the avalanches that might have overwhelmed them—until the summit is theirs!"

It may be doubted whether the entire history of mountaineering affords a more remarkable story of combined audacity and persistency or of strenuous toil and



AFRICA'S MOST FAMOUS MOUNTAIN, RUWENZORI Photo by Vittorio Sella

The highest summits, Peaks Margherita and Alexandra, are here seen from the south rising above Lake Bujuku, itself 12,850 feet above the sea. Giant senecios in the foreground. (See pages 256-264, March, 1909, NAT. GEOG. MAG., for a further description of this noted peak.)

endurance, though it may be admitted that here, as in the case of Mount Saint Elias and of Kabru, there were no serious technical difficulties.*

RUWENZORI

Almost simultaneously with the departure of Doctor Cook's party for the second attack on the loftier compeer of Mount Saint Elias, the conqueror of this peak was setting out upon a task of greater difficulty under conditions almost diametrically reversed—the ascent of Mount Ruwenzori, the snowy source of the Nile, rising almost upon the Equator. Here also several previous attempts had been made, both by explorers and alpinists. The more successful of these had set foot on the glaciers, yet none had reached a point sufficiently high, or with weather clear enough, to overlook the region and bring back satisfactory topographical data. Here again careful preliminary arrangements, adequate resources, and perfect discipline were crowned with a brilliant success. The mystery of these till recently unheard of mountains—though there seems little doubt that they are the "Mountains of the Moon" of Ptolemy (A. D. 151)—has now been completely dispelled, and the map shows even intimate details of their somewhat complicated topography; for Ruwenzori is not a mountain, but a group of six connected *massifs*, each rising in several peaks and all crowned with eternal snows. These are fourteen in number, of which nine range between 15,800 and 16,815 feet, and are therefore higher than Mont Blanc.

Leaving the shore of the Indian Ocean at Mombasa on May 4, the party made the quickest possible passage through the fever-breeding country by rail and by steamer on Victoria Nyanza to Entebbe, on its northern shore. With an army of 220 porters and yet other attendants, they proceeded by short stages of fifteen miles a day to Fort Portal (218 miles), the capital of the Protectorate of Uganda, the farthest outpost of civilization. Rising stage by stage, no longer by roads but by trails up slippery hillsides and over timbered ridges and rushing streams, amid strange, weird tree-growths, and with the wild beasts of the jungle sometimes in evidence, they came at length to their permanent camp, Bujongolo (12,350), a comfortless place under the inhospitable shelter of an overhanging cliff, distilling the ever-condensing fogs of long days of rain. Here a hardier race of negro porters, took the place of those from the lowlands. From here the numerous excursions set out.

Of the eighteen summits of the six *massifs* that form Ruwenzori fourteen, including all the highest ones, were ascended by the Duke of the Abruzzi and his guides, followed later by the smaller parties in several instances. Vittorio Sella made nine ascents of six summits, and procured the superb series of photographs which make the printed narrative* one of the most beautiful of recent alpinistic contributions to geographic literature. The six *massifs* were named for leading African explorers, the name of Stanley being given to the one bearing the highest peaks. On Stanley there are five summits, to the two loftiest of which were given the royal names of Margherita and Alexandra. A large amount of data with regard to topography, geology, mineralogy, meteorology, and botany was collected and forms a compendious appendix to the story. This brilliant campaign required four months for its execution, and though the fever compelled the dropping out of one of the party at Mombasa and detained Captain Cagni for two weeks at Entebbe, so far as appears no life was sacrificed during the expedition.

ALPINE ACCIDENTS

Indeed, in this story of the world's most notable ascents, conducted largely in inaccessible regions and under extraordinary conditions, we have had occasion in but three instances to allude to

* A superb series of illustrations of Alaska's mighty peaks will appear in the July number of this Magazine.

* Ruwenzori. New York, E. P. Dutton & Co., 1908.

Photo by G. P. Abraham

VIEW FROM NEAR THE SUMMIT OF THE MATTERHORN, SHOWING DENT D'HERENS, MONT BLANC, ETC.

The actual summit is the crag on the right

SASS MAOR, IN THE TYROLESE ALPS

Photo by Vittorio Sella

Though but 9,240 feet in altitude, its limestone precipices furnish a very difficult climb. First made in 1875

Photo by G. P. Abraham

THE BERGLI HUT (9,745 FEET), IN THE BERNESE OBERLAND

This refuge affords a superb view of the Schreckhörner, Wetterhorn, etc.

fatal accidents. In view of the pitiful and mortifying list of fatalities annually occurring in the Alps, this comparative immunity is suggestive. While the most skillful mountaineers may meet with unforeseen and unpredictable disaster, it is not this class which usually furnishes the victims. Again these larger enterprises are undertaken with deliberation and carried out with judgment. Time is an important factor and generously allowed; hence the dread of today's failure does not disturb serenity nor stimulate to rashness. Athletic *tours de force* are not attempted, though, after due weighing of risks, serious difficulties are met and overcome.

The conditions, therefore, are quite different from those which attended two of the most notable of accidents, that of Mr Whymper's party in the first ascent of the Matterhorn, in 1865, and the terrible one on the Dent Blanche, in 1899. In the former the party, already too large for safety, contained a novice, whose unnecessary slip at a critical moment on the descent hurled the chief guide from his footing and dragged two others after them to their death. The breaking of the rope alone saved Mr Whymper and his two guides.

In the other case, a notably rash climber with skilled companions was ascending one of the most difficult mountains by its most difficult (west) arête. Standing supported upon an ice-axe held by those below him, shortly below the summit, the chief guide slipped, fell, and dragged down to death three others. The rope, made fast about a rock above the last man, broke, leaving him alone to make the perilous traverse over the summit and to suffer a thousand deaths in the awful two days and nights that elapsed ere he dragged himself at length, exhausted and famished, to a place of

Photo by Vittorio Sella

THE MATTERHORN, SHOWING ON THE LEFT THE ZMUTT RIDGE, WHICH AFFORDS THE MOST DIFFICULT OF THE ASCENTS OF THIS NOTED PEAK

A CREVASSE FROM BELOW THE BERGLI HUT Photo by G. P. Abraham

Photo by G. P. Abraham

THE OLD "CABANE" ON THE EAST FACE OF THE MATTERHORN AT 12,526 FEET ABOVE THE SEA

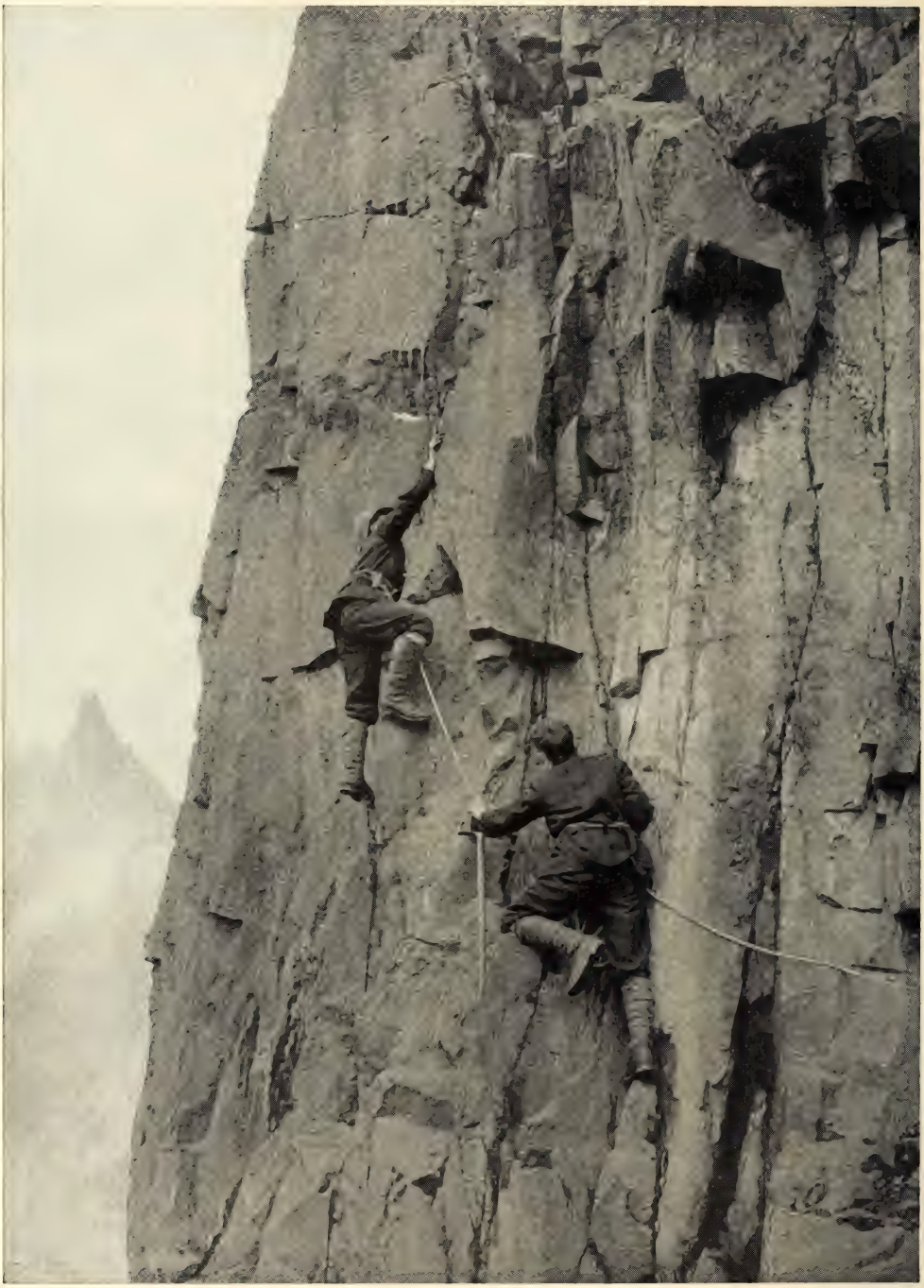
Photo by G. P. Abraham

THE "EAGLE'S NEST," THE MOST DIFFICULT ROUTE TO THE GREAT GABLE

This and the following view represent very difficult rock climbing in the Lake District of England, the training ground of some of her most expert cragsmen

THE NAPES NEEDLE, GREAT GABLE Photo by G. P. Abraham

Climbed by Haskett Smith, alone, in 1886. "One of the most daring things that have been done in the Lake District," so reported by Owen Glynn Jones, who perished on the Dent Blanche in 1899.



ON THE TRAVERSE OF THE GRÉPON Photo by G. P. Abraham

An episode in one of the most difficult climbs among the Chamonix Aiguilles. First ascended in 1881 by A. F. Mummery

Photo by G. P. Abraham

DENT DE SATARMA, IN THE CENTRAL PENNINE ALPS

A curious rock needle, 120 feet high, apparently difficult, yet "accessible by a rough scramble of ten minutes"

A MISTY MORNING: ON THE WAY TO THE AIGUILLE DE LA ZA Photo by G. P. Abraham

AMONG THE CREVASSES OF THE UPPER GRINDELWALD GLACIER

Photo by G. P. Abraham

safety—perhaps one of the most harrowing of all these tales of horror.

CONCLUSION

We have scheduled rather than narrated the most notable of the new ascents of the last half century. Many have been the conquered peaks, and in several regions few of the first order have been left unclimbed. In others there still remains an embarrassment of riches, as particularly in the great Asiatic field. Even as we write these lines the Duke of the Abruzzi, with his earlier companions, Sella, De Filippi, and the guide, Brocherel, who was with Dr Langstaff on Trisul, are *en route* for Kashmere with Mount Godwin-Austen, K_2 (28,250), as their goal—the second highest measured peak on our globe. Not underestimating the difficulty of surpassing present records, they are making this their endeavor, and their many well-wishers on both sides of the Atlantic are confident that all that careful preparatory study, perfect equipment, and resolute wills can accomplish will surely be performed.

On our own continent many prizes still remain to be won. In the Canadian Rockies, Mount Robson (13,700 feet), presumably the highest of the range, beckons from afar in its northern seclusion; nearer at hand the bold north tower of Mount Goodsir will doubtless prove as fine a climb as its vanquished companion, while for those who will brave the untraveled tangle of a dense primeval forest the loftiest peaks of the Selkirks are waiting. And how comes it that those superb southern outposts of the Alaskan range, Fairweather (15,500), Crillon (15,900), and La Perouse (11,300), have never so much as been attempted, though the tide of summer travel brings hundreds annually within sight of their proud fastnesses? It is doubtful whether Mount Logan, with its added thousands of feet in altitude, would offer a more sporting climb than these glorious peaks. It is clear that American alpinists have no need to seek upon other continents a field for exhilarating climbing or fruitful exploration.

A WONDERLAND OF GLACIERS AND SNOW

By Milnor Roberts, University of Washington, Seattle

THE Editor of the National Geographic Society recently asked the members to name those articles in the last volume of the Society's Magazine which seemed most interesting. Opinions on such a question naturally would differ widely, but it must be admitted that in the remarkable array of subjects treated some of the most striking articles consisted of illustrated descriptions of snow-clad mountains and polar regions. The remoteness of these scenes may add to their charm, but it also lessens our chances of ever seeing them. The Mount Rainier National Park, a wonderland of glaciers and snow in our own country, is so easily reached in summer that it is becoming fairly well known to travelers. A recent visit to the park made by the writer and a party of friends has shown that the slopes of Mount Rainier may be reached even in winter without discomfort.

The Mount Rainier National Park, of 324 square miles area, includes the symmetrical, glacier-clad slopes of the mountain and a broad belt of magnificent forest land around its base.* In 1883 Pro-

* Glaciers of Mount Rainier, by Israel Cook Russell; with a paper on The Rocks of Mount Rainier, by George Otis Smith. 18th Annual Report, U. S. Geological Survey, part II, pages 349-423, illustrated.

MELTING SNOW CLINGS TO THE SKIS Photo by Carl F. Gould

fessor Zittel, the geologist, and Prof. James Bryce wrote of Rainier:

"The peak itself is as noble a mountain as we have ever seen in its lines and structure. . . . The combination of ice scenery with woodland scenery of the grandest type is to be found nowhere in the Old World, unless it be in the Himalayas, and, so far as we know, nowhere else on the American Continent."*

The altitude of Rainier has been reported between 14,394 feet† and 14,526 feet, placing it either first or second among the peaks in the United States proper. A difference of a few feet, which can be determined only by accurate measurement, is of slight importance to the ordinary observer. The noteworthy facts are that Rainier stands absolutely alone, is snow-clad throughout the year, and may be seen in its entirety from sea-level at distances of forty to one hundred miles to the westward.

* Ibid., page 412.

† Mount Rainier, Mount Shasta, and Mount Whitney as sites for Meteorological Observations, by Alexander G. McAdie. Sierra Club Bulletin, Vol. VI, No. 1, January, 1906, pages 7-14, illustrated. San Francisco, Cal. (See other articles in this number.)

The Cascade Range, in its north-south course across the State of Washington, has a general summit elevation varying from five to seven thousand feet, above which tower the volcanic peaks of Mounts Adams, Saint Helens, Baker, and Rainier. Glaciers still linger on nearly all the higher peaks, as relics of the ice-sheet which once covered the whole range. Many cirques of former glaciers are occupied now by fields of snow and névé of great thickness. The snowfall is heavy throughout the mountains, due to the chilling of the warm, moist winds from the Pacific. In spite of the glaciers and snows, the winter climate of the Cascades is mild.

The railway station nearest to the Mount Rainier National Park is Ashford, on the southwest, fifty-five miles from Puget Sound by the Tacoma and Eastern Railway. Camping parties with wagons or automobiles must come in from the lower country by the county road passing through Ashford, but packtrains can be driven into the park by four or five other routes. The county road from Ashford continues up the Nisqually River for six miles, to the western bound-

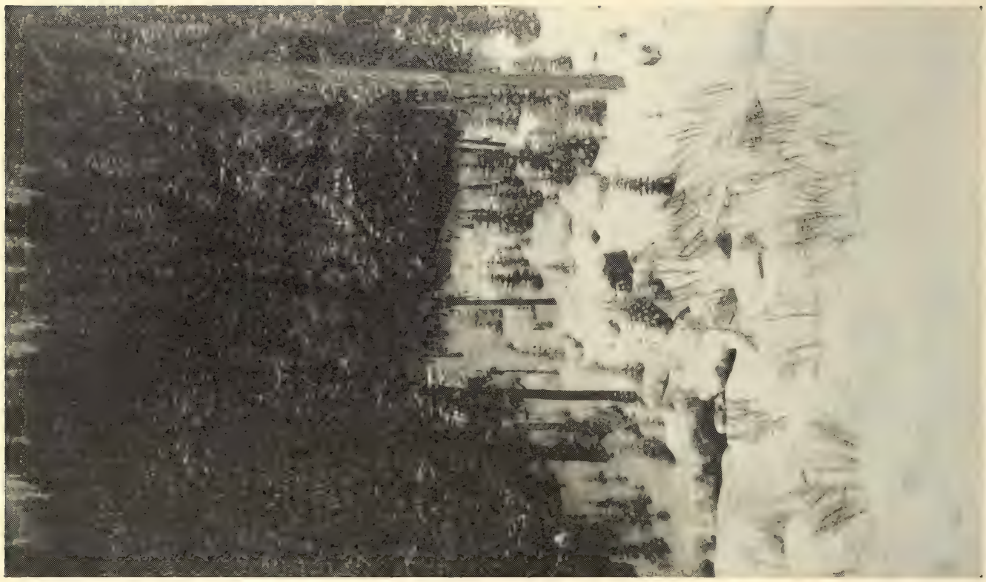


Photo by Milnor Roberts

7 FEET OF SNOW ALONG PARADISE RIVER

Photo by Milnor Roberts

EAGLE PEAK FROM THE RAMPARTS

Photo by Milnor Roberts

SOUTHERN FACE OF MOUNT RAINIER: 10,000 FEET FROM VALLEY TO PEAK

Photo by Carl F. Gould

SKI RUNNERS ON THE WAGON ROAD IN MOUNT RAINIER NATIONAL PARK

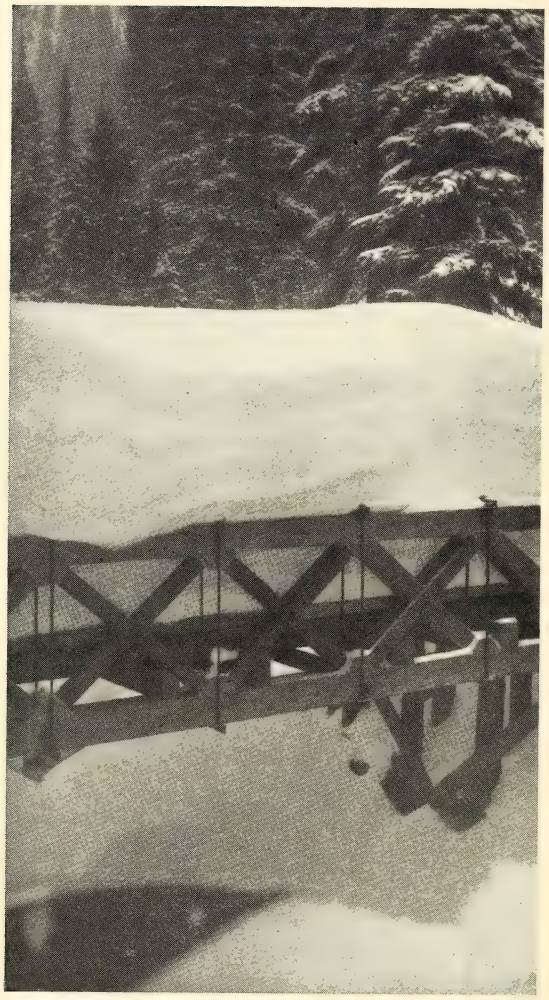


Photo by Milnor Roberts

14 FEET OF SNOW ON THE WAGON BRIDGE ONE-HALF MILE ABOVE NARADA FALLS: MARCH 30, 1909

ary of the park, at which point it joins the government road. The latter has a maximum grade of 4 per cent, and extends to Paradise Park, a favorite camping ground near timber-line, between the Nisqually and Paradise glaciers.

In summer the Ashford stages run thirteen miles, to Longmire's Springs, where there are two hotels. The road is open, however, past Nisqually Glacier and Narada Falls, several miles farther up. During the season of 1909 a temporary road with steeper grades will be completed to Camp of the Clouds, at an altitude of 5,600 feet. Eventually the permanent road will reach 7,000 feet, where trails will branch off. An automobile party leaving Seattle or Tacoma in the morning can pitch its evening camp in one of the dense groves of stunted trees at timber-line in the shadow of the great peak, looking out upon the jagged pinnacles of the Tatoosh Range and the vast forest wilderness to the westward.

On March 18 our party found three feet of snow at the National Park Inn at Longmire's Springs. On the morning after our arrival a dense cloud-bank hung a few hundred feet overhead. Frequent flurries of snow came drifting down from it, now in matted bunches of moist flakes an inch wide, again as separate crystals, these in turn giving way to little rounded pellets like dry sago, which hopped from bough to bough down through the evergreens. Our skis settled silently through the fresh snow, as we trailed up the government road along the Nisqually River, intending to break a trail part way to Paradise Valley, the goal of our trip. During the midday thaw, masses of snow clung to the worn spots on the sole of a certain ski in the outfit. After many gyrations and contortions had been made by its fair owner in removing the burden, she announced piously, "My soul is ready for Paradise," and on we "mushed" again.

On the trail up the narrow valley of the Paradise River the snow was found to be a foot deeper for each two or three hundred feet of elevation gained. So quietly had the flakes fallen in the sheltered valleys that each stump and fallen tree was covered almost as deeply as the surrounding ground, as some of the photographs show. On the exposed ridges, however, the winds had piled huge drifts over the brow of every leeward slope.

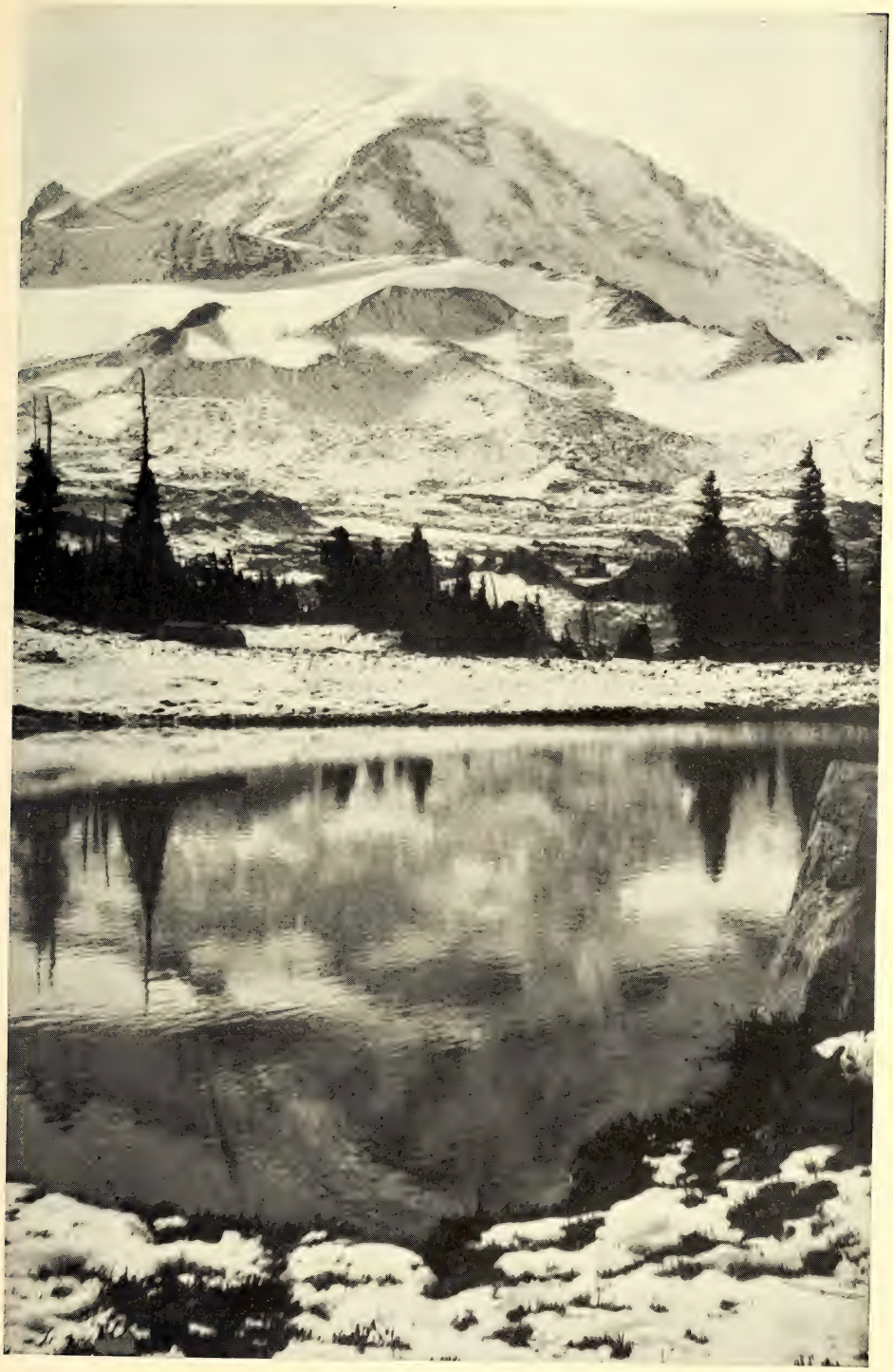


Photo and copyright by Romans Photographic Co.

MOUNT RAINIER FROM CRATER LAKE

Photo and copyright by Romans Photographic Co.

MOUNT RAINIER (14,363 FEET) FROM LAKE WASHINGTON (ELEVATION 22 FEET), AT SEATTLE, 60 MILES NORTHWEST

Cornices of snow overhanging the crags of Eagle Peak had broken off and shot down its precipitous northern side, coming to rest on a long talus slope near the stream. There we reveled in ski sliding and jumping. Huge boulders in the talus beneath the seven-foot covering of snow had caused hummocks on the surface which served us in place of the artificial take-offs used in regular ski jumping.

Two divisions of our party made the ascent to Paradise Valley. The first group consisted of three men, including the writer. We followed the general course of the horse-trail, but made frequent cut-offs by crossing Paradise River on the snow bridges. The only toilsome part of the journey was at Narada Falls, where we were forced to navigate our skis sidewise, in crab fashion, up the steep slope. Half a mile farther upstream, on the second bridge of the government wagon road, the snow measured more than two ski-lengths in depth, at least fourteen feet, without a sign of drifting. Under the bridge was a pool of open water overhung on all sides by rounded cornices of soft snow. A few inky-bottomed wells marked the upper course of the stream for a short distance, until it disappeared entirely under the deepening load of snow.

The long, open meadow in Paradise Valley lay like a smooth floor of snow, rising slightly until it merged into the final slopes of Mount Rainier. The surrounding ridges, dotted with the tops of stunted trees, had been so rounded and smoothed by drifting that the small gulches and hillocks of ground were almost blotted out. Constant shifting of the dry snow had produced a fine, powdery surface everywhere. All appearances indicated that the snow in the open meadow of Paradise Valley was much deeper than at the bridge where we had measured it. The difference in location and elevation of the two localities may be held accountable for such a condition. Some marks which we made on a tree trunk at the surface level of the snow will be interesting reading in summer.

Excellent views of Mount Rainier and its southern glaciers were had on a brilliant sunny day from the Ramparts, a long ridge covered with standing burnt timber, extending southward from the mountain. A series of cascades in the South Tahoma Glacier caused the ice to stand out in jagged blocks against the skyline. The surface of the Kautz Glacier was perfectly smooth with snow except at its cascades. From Gibraltar Rock a snow banner as large as the rock itself waved to the eastward.

On March 24, another cloudless day, two young ladies of our party, accompanied by James McCullough, watchman at the National Park Inn, made a ski trip to Sluiskin Falls, considerably beyond the point reached by the first party. As both the ladies had ascended Rainier in summer, they could enjoy to the utmost the wonderful view of the snow-clad range spread out before them.

The Cascade Range in its winter garb is just beginning to be appreciated. Hotels at several mountain resorts now remain more or less open throughout the winter. The great advantage of visiting the higher altitudes lies in the drier snow usually found there, with only a slightly lower temperature. The beauties of the forests and the snow-fields may be seen without hardship by any visitor, while experienced mountaineers have unlimited opportunities for climbing and exploring on trips of two or three days. The writer's experience, gained through mining work in various parts of the range at all seasons, has been that only the severest storms or the heaviest rains make the Cascades unpleasant. So far as ski sport is concerned, it would be difficult to imagine more perfect riding than can be had on the many miles of varied slopes in Paradise Park. Judging by the fresh tracks of snowshoe rabbit, weasel, marten, fox, wildcat, white goat, and bear which our party saw in a few days, it is safe to say that the Mount Rainier National Park offers good chances to the camera-hunter.

VIEW SOUTH FROM KEARSARGE PASS (11,823 FEET) ALONG THE MAIN CREST, THE BACKBONE, OF THE HIGH SIERRA: UNIVERSITY PEAK IN BACKGROUND (13,583 FEET)

"We do not find among the Main Crest peaks any mountains rising as great isolated masses. They are rather peaks capping a gigantic wall than great individual mountains. For the same reason the passes over the Sierra are high relatively to the peaks. For instance, between Mammoth Pass and the Hockett Trail, nearly 1,000 miles, there is no notch lower than 11,000 feet." Note and photo by Joseph N. Le Conte

THE HIGHEST POINT IN EACH STATE

FREQUENT reference is made to the highest point in the various states of the United States, and in many instances they are erroneous as to elevation and even to location. Books of reference differ greatly as to the heights of well-known summits, and in some states the highest points have not been measured. The Government surveys afford data for many of the states, and the following figures, compiled by N. H. Darton, of the U. S. Geological Survey, are mainly from that source. A few special determinations were made by Mr Darton in the course of his geological work in the West:

List of Highest Altitudes in the States of the United States.

The data are from *maps* of the U. S. Geological Survey, unless otherwise stated.

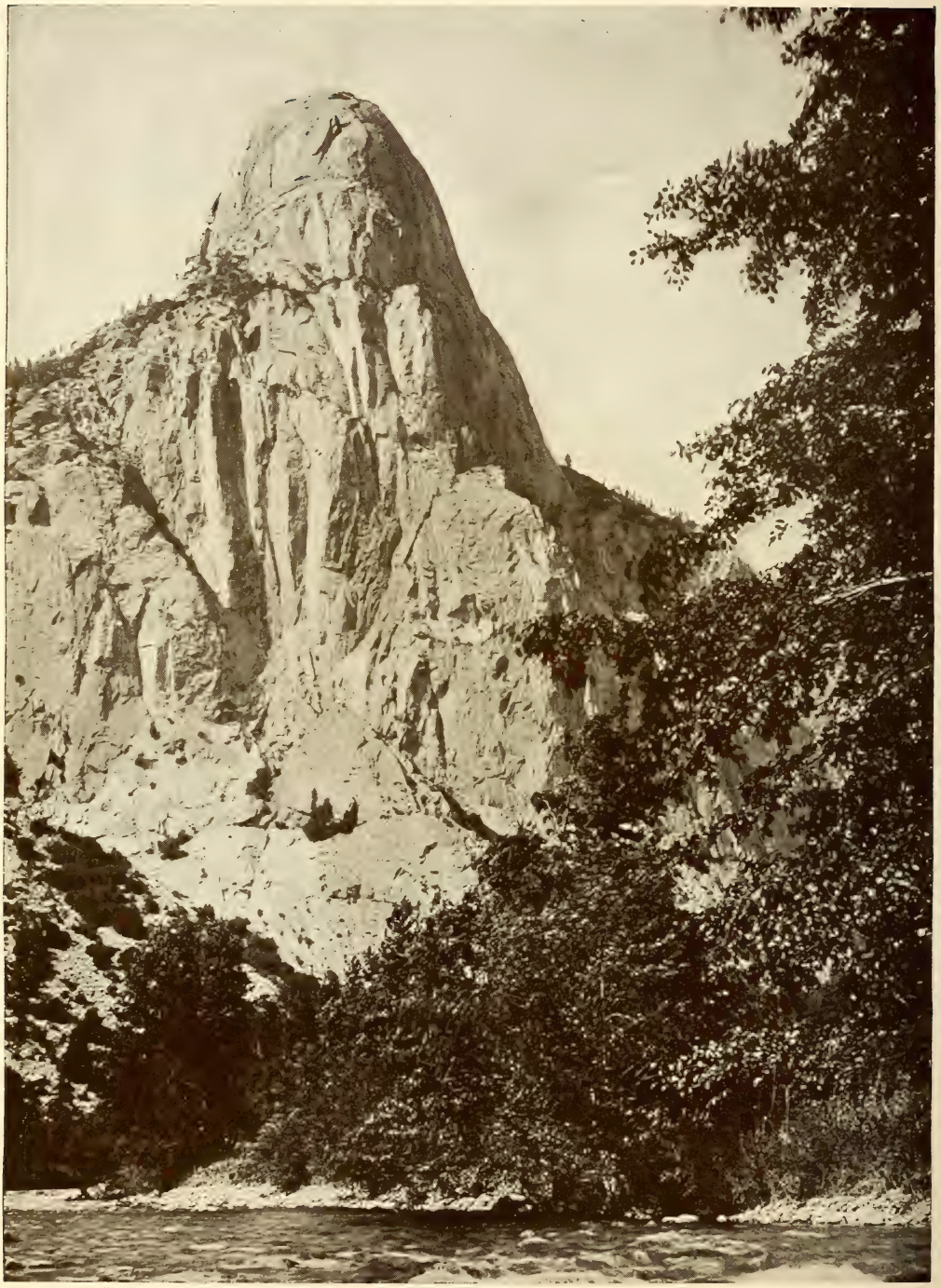
Alabama, Che-aw-ha Mountain	2,407
Alaska, Mount McKinley	20,300a
Arizona, San Francisco Peak	12,611
Arkansas, Magazine Mountain (?)	2,800a
California, Mount Whitney	14,501
Colorado, Mount Elbert	14,436
Connecticut, Bear Mountain	2,355
Delaware, 2 summits near Brandywine	440+
Dist. of Co'umbia, Fort Reno, Tenley	421C
Florida, near Mount Pleasant Station	301 RR
Georgia, Brasstown Bald Mountain	4,768
Idaho, Hyndman Peak	12,078
Illinois, Charles Mound	1,257R
Indiana, near summit, Randolph Co.	1,285a
Iowa, 5 miles SE. of Sibley	1,670S
Kansas, West boundary, north of Arkansas River	4,135a
Kentucky, The Double, Harlan Co.	4,100a
Louisiana, summits in western parishes	400+ S
Maine, Mount Katahdin (west)	5,268
Maryland, Backbone Mountain	3,400a
Massachusetts, Mount Greylock	3,505
Michigan, Porcupine Mountain (?)	2,023L
Minnesota, Misquah Hills, Cook Co.	2,230aS
Mississippi, near Holly Springs	602
Missouri, Tom Sauk Mountain	1,800aS
Montana, Granite Peak	12,834aK
Nebraska, Plains in SW. corner	5,300+D
Nevada, Wheeler Peak	13,058C
New Hampshire, Mount Washington	6,290
New Jersey, High Point	1,809
New Mexico, peak 2 miles N. of Truchas Peak	13,306
New York, Mount Marcy	5,344
North Carolina, Mount Mitchell	6,711
North Dakota, south part Bowman County	3,500+D
Ohio, 1½ miles E. of Bellefontaine	1,540W
Oklahoma, SW. corner T. 1 R. 1	4,700+D
Oregon, Mount Hood	11,225
Pennsylvania, Blue Knob	3,136
Rhode Island, Durfee Hill	805
South Carolina, Sassafras Mountain	3,548
South Dakota, Harney Peak	7,240
Tennessee, Mount Guyot	6,636G
Texas, El Capitan, Guadaloupe Mtn.	8,690
Utah, Mount Emmons	13,428
Vermont, Mount Mansfield	4,406C
Virginia, Mount Rogers	5,719
Washington, Mount Rainier	14,363
West Virginia, Spruce Knob	4,860
Wisconsin, Rib Hill (?)	1,940S
Wyoming, Mount Gannett	13,785

a, approximate; +, or slightly higher; C, U. S. C. and G. S; S, State Survey; L, U. S. Lake Survey; W, U. S. Weather Bureau; R, C. W. Rolfe; K, J. P. Kimball; G, Guyot; RR, Railroad; D, N. H. Darton.

The highest points in Delaware are two rounded summits, one a mile east of Brandywine, and another just south of Centerville, both of which are slightly over 440 feet. The point given in the table as the highest in Maryland is in the narrow disputed strip lying along the West Virginia line. If this belongs to the latter state the highest point in Maryland will be a 3,340-foot peak a mile northwest of the 3,400 foot one. There is some doubt as to the highest points in the Central States, notably in Michigan, where it is claimed that Huron Mountains, in Marquette County, are higher than Porcupine Mountain. It is possible also that there are higher points in Minnesota and Wisconsin than those given, but they have not been measured.

In Florida the land north of Mount Pleasant probably is slightly higher than at the railroad station. In Louisiana the elevation is slightly more than 400 feet in Kisatchie Hills, in Sabine Parish; in some hills in the southeast corner of Claiborne Parish, and in some ridges in Vernon Parish, all in western part of the state, but their heights have not been accurately determined.

Arkansas has two peaks of nearly the same altitude. Magazine Mountain,



TEHIPITE DOME

Photo by Joseph N. Le Conte

The clean, white granite walls of this noble dome rise as vertical precipices about 3,700 feet. The dome is the most impressive feature of Tehipite Cañon in the High Sierra and is the grandest rock face outside of the Yosemite Valley itself, and in many respects is not inferior to El Capitan or the Half Dome.

about 2,800 feet, and a peak on Fourch Mountain, in the southern part of Scott County, which has been determined as 2,800 feet.

The precise locations and heights of the highest points in Nebraska, Oklahoma, Kansas, and North Dakota have not been ascertained. A high ridge north of Kenton, Oklahoma, rises to 4,700 feet or higher. The highest point in Kansas is near where the west boundary is intersected by the Greeley-Wallace County line. Its altitude is about 4,135 feet. The highest point in North Dakota is in Bowman County, near the southern boundary on the divide east of the Little Missouri. The highest place in Nebraska is on the plains near the southwest corner of the state, where an altitude of about 5,300 feet is attained.

BRITTANY: THE LAND OF THE SARDINE*

By Hugh M. Smith

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OCCUPYING the large peninsula at the northwestern corner of France—washed by the English Channel and the Bay of Biscay—is a rugged country, with rugged inhabitants, who are less French than any other people of the Republic. Brittany has no political existence, and is not even represented on some modern maps, because it terminated its individual career in the closing years of the eighteenth century; but the Bretons, differing in ancestry, language, and temperament from their neighbors, have held aloof and maintained their racial characters in a way almost unparalleled in European history. Fierce wars have left their scars, and the concomitants of modern civilization have made their enduring impress on people and country; but so much of the ancient customs and landmarks has survived that Brittany is still a well-marked geographical and ethnological entity and bids fair to remain such for many generations.

This isolation of Brittany from the remainder of France, while at the same time the province is comparatively easy to reach and traverse, has for many years made it a popular holiday and vacation resort for Parisians and Londoners, and has attracted the notice of regular travelers and tourists who, having "done" the Alps, the Rhine, the Norwegian fjords, the Riviera, and the European capitals, are seeking new worlds to conquer. Artists of all lands have likewise found this a most agreeable field for work and recreation. The popularity of the region is attested by a score of modern books of travel, some written and illustrated by clever artists, describing the quaint charm of country and people and always giving the reader a keen desire to go and see for himself.

Some years ago I was privileged to visit Brittany in the interest of the Bureau of Fisheries, and the personal observations I then made incidentally to the special inquiries in hand form the basis for these necessarily desultory remarks.

WHERE THE BRETONS CAME FROM

The original name of Brittany was Armorica, which was changed in consequence of extensive immigration from Great Britain in the fifth and sixth centuries. The Armorican tribes formed a part of that race of which the Irish, Highland Scotch, and Manx constitute one division, and the Welsh, Cornish, and Breton the other. The Celtic language there spoken at the present time is divided into three or four rather distinct dialects, and is understood, if not

*An address to the National Geographic Society, March 26, 1909.

actually used, by a very large percentage of the native population. Many of the older Bretons cannot speak French, and in 1902 it was found that the French language was unknown or unused by 700,000 of the people. The government now requires the learning of French by the young, so we may expect the gradual disuse and final death of this ancient tongue.

Taking a brief glance at the history of Brittany, we may note that at a very

Photo from Hugh M. Smith

LITTLE BRETON MAIDS

remote period this country became thickly settled by a dark-skinned people that, starting a westward migration from some part of Asia, left monuments along their route throughout central and northern Europe, and only ceased their wanderings when stopped by the sea in Scandinavia, Ireland, Great Britain, France, Portugal, and Spain. In prehistoric times the Gauls conquered this early race; and then came the Roman conquest and the Roman occupation of Gaul until the fourth century, up to which time the peculiar religious practices of the aboriginal race appear to have flourished unmolested by either Gauls or Romans.

We read that in 383 Maximilian, son-in-law of Octavius of England, and his nephew, Conan Meriadec, went over to Armorica and endeavored to displace the Romans. This venture cost the lives of some 15,000 soldiers. Then Maximilian took over a huge army and eventually overcame the Romans. Conan became king of the country, which he called Little Britain, or Bretagne; and, making his capital at Nantes, he invited his countrymen, who were then very hard pressed by the Scots and Picts and Saxons, to come over and join him. Many thousands responded to this and subsequent invitations, and by the time of Conan's death, in 421, Christianity, that had been introduced with the Briton immigrants, had been established and paganism almost abolished over a large part of the country.

In the middle ages the dukes of Brittany exercised semi-royal prerogatives, and the people had a separate parliament for many years preceding the French Revolution. At the outbreak of that momentous struggle the Bretons lived up to their reputation for conservatism and remained loyal to the monarchy, and forcibly resisted the establishment of the republic long after the other parts of France had accepted the new regime. This sanguinary chapter in the history of the country has been vividly portrayed in Balzac's stirring novel, "The Chouans."

The Britons, at first the friends and kindred of the Bretons, eventually became their hereditary enemies. For centuries the British privateers and naval vessels ravaged this coast, blockaded the harbors, bombarded the towns, landed fighting parties, and the long-continued and deep-seated animosity thus engendered still abides in this land, where changes in habits and customs and sentiment occur very slowly.

The present population of Brittany is about 3,260,000. The principal cities are

Brest, the great naval port of France, beautifully located on one of the best harbors in all Europe; Rennes, in the interior, brought prominently to the world's notice some years ago as the scene of Dreyfus' first trial; and Nantes, on the Loire, the largest and one of the most interesting places in all Brittany. Its chief attraction is its hoary age and romantic history. It is mentioned by Cæsar, Pliny, and other writers of their time, and was a city of note long before Cæsar divided all Gaul into three parts. In the middle ages it was one of the most valuable possessions of the semi-royal dukes of Brittany, and when, in 1499, Anne of Brittany here wedded Louis XII it passed to the crown of France. During the Revolution it was the scene of the most atrocious massacres, and in 1793 fully 30,000 men, women, and children were here butchered.

SUPERSTITIOUS TEMPERAMENT OF THE BRETONS

Every observant traveler soon realizes that the dominant note in the Breton character is the universal and ineradicable belief in a higher power, which is not only worshipped, but is regarded as influencing or determining every incident in their daily lives. Most peculiar religious superstitions are current; witchcraft, charms, and antidotes are believed in, and fairies and other creatures of a childlike imagination here have a very real existence to both young and old.

All of the people are now nominally Christians, but Druidism flourished in some remote sections as late as the seventeenth century, and it is an interesting fact that the veneration accorded the heathen deities in the earliest centuries of Breton history was easily transferred to the Holy Family and the Christian saints when the new religion reached the country. In no other part of Europe, if indeed in any other part of the world, has Christianity absorbed so much of earlier creeds, and it requires no particularly astute observer to appreciate that many features of Breton religious practice today are relics of prehistoric paganism.

It is easy to understand how the superstitious temperament of the Bretons has been developed by their isolated geographical position and the impressive character of the country, by their distinct language, and by their being brought constantly in contact with those strange megalithic remains which are here more numerous than anywhere else.

A sympathetic foreigner* has given an admirable estimate of Brittany and the Breton character that should always be borne in mind:

Photo from Hugh M. Smith

ITINERANT BASKET VENDOR

"Those who would wish to see Brittany as she really is must not look at her wild and barren plains, her bleak, dreary mountains, her dark and sombre forests, her stormy and rock-bound shores, and her lonely, lovely valleys with the hasty glance they cast on any other passing landscape, with the hard practical eye and fastidious tastes of modern travelers; they must think of her as the land that has been consecrated by the earliest feats of chivalry, perhaps the only spot in the modern world that has preserved in her legends untarnished the

* Wallace-Dunlop: Wanderings in Brittany.

'eternal youth of phantasy.' Here, it is not only 'the spirit that haunts the last year's bowers,' but the spirit of ages past, that looks you in the face.

"The traveler must not regard the melancholy Breton, alternately taciturn and eloquent, simply as an unlettered and morose peasant, but as a being cradled in superstition, endowed by nature and education with a vivid imagination, with a deep, true, poetical sense, with strong and gloomy religious views, to whom the 'spirit-land' is an ever-present, an ever-living reality, and who indemnifies himself for his hard lot on earth by a constant reference to the future joys of heaven."

ABOUT THE SIZE OF MARYLAND

Brittany is a small country. Its extreme length from north to south is only 150 miles and its greatest width is about the same. The area is 13,600 square miles, or a little larger than the State of Maryland.

The peninsula has a backbone of crystalline rock, and the country should be classed as semi-mountainous, although there are no noteworthy elevations. It bears a strong resemblance to the peninsula of Cornwall, the nearest land toward the north, but the parts away from the coast are much inferior to Cornwall in fertility and attractiveness and contain no mineral deposits of great value. Some rather extensive forests still remain, but the characteristic feature of the interior regions is the vast tracts of wild moorland, marked only by melancholy stone monuments.

The coast is much intersected and is the only part of France that abounds in good harbors; this fact, together with the abundance of water products, has made the sea the dependence of a large proportion of the population.

The characteristic dress of the people, changing as little as their beliefs and customs, is practically the same in every detail as it was generations ago. Now and then we see a man or woman who has been to Paris or London and affects a modern style; but the great mass of the population have no intention or desire to adopt any newfangled fashions, and it is this fact that gives such a distinctive charm to city and suburban sights.

For all ordinary purposes and on all ordinary occasions, the women dress in short skirts and loose waists of some cheap black or dark-blue fabric, and usually wear a broad white collar and often a white or colored apron. White caps with or without lace are invariably worn out of doors, and the hair is usually scrupulously concealed.

In the coastwise districts the dress of the men usually consists of a coarse blouse, loose trousers, and a flat woolen or cloth cap. On special occasions, such as weddings and church festivals, the men wear a short black velvet or cloth jacket with large buttons, and a low-crowned, wide-rimmed hat with long ribbons hanging down behind.

The dress of both men and women shows slight peculiarities depending on the district or section, so that it is often possible for a foreigner soon to determine the village or town from which given persons may have come, and even adjacent villages will have slight differences in shape of cap, style of neckwear, or cut of skirt that are readily appreciated when once pointed out. There are also slight peculiarities of dress dependent on occupation.

Along the extensive coast the sea incessantly exacts a heavy human toll, and the extent of this is everywhere and on every occasion manifest in the sign of mourning worn by the women—a partly black cap replacing the white one. Sometimes I met groups of women nearly every one of whom showed by her dress the recent loss of husband, father, son, or brother.

SOME CUSTOMS OF THE PEOPLE

A bride among the peasant and fishing people may be recognized by the handsomely embroidered apron and abundance of hand-made native lace on bonnet, skirt, and waist.

Apropos of lace, I may state that philanthropic people in Paris, America, and

elsewhere have turned their attention to possible industries for the coastwise Bretons that will not be dependent on the uncertain hazard of the sea, and among other things they have suggested is the revival of lace-making to give employment for the women, who in past years used to make lace that for beauty was not surpassed in France; but this industry has fallen into decay.

The differences in the dress of adults dependent on place of residence and occupation are seen likewise in the clothes of the children. Some of the quaintest, drollest bits of humanity imaginable are met with among these people.

The Bretons have large families, which, as you are well aware, is not the case in other districts of France at the present time. The children are necessarily much neglected by their parents, who are thoroughly occupied with their labors during the day. As the children play in the dirty roads and streets and on the dirt and mud floors of their homes, they manage to acquire and retain more misplaced matter than any other youngsters I ever saw. It is said that in the coast towns, where the struggle for existence is so keen and every available moment must be occupied while the fishing is in progress, the children have their face and hands washed only once a week and their clothes changed even less frequently. I am sure that your observations would concur with mine and confirm this report. But it must not be supposed that in town and country one does not see many attractive, well-kept youngsters.

Nearly every one wears huge clumsy wooden shoes, which are made by hand in the country districts. As the streets and roads are hard and as the shoes are loose, the people make a great clatter when they walk. The characteristic sound of the villages and towns is the rumble of wooden shoes.

The Bretons are a highly moral people. Practically their only vice is drink, but that is in reality a scourge. "The soberest have their days in which they usually get dead drunk." Drunkenness is particularly prevalent among the fishermen, whose hard life, together with the uncertainties of fishing and the ease with which comparatively large sums are sometimes acquired by a lucky strike, seems to induce an extraordinary amount of dissipation that is made possible and encouraged by numerous cheap public drinking houses in all the coastwise villages and towns.

CHEERLESS HOUSES

The abundance of stone everywhere and the scarcity of timber in many places have determined the building material for most of the houses, churches, and other structures in Brittany. When for any reason building stone is scarce or otherwise lacking, the people have often had recourse to the prehistoric monuments for their homes and churches.

The churches afford most fascinating material for the study of the architect and the antiquarian. Beginning with the eleventh century, they present a most interesting record of the evolution and progress of ecclesiastical architecture. Large castles are rare, and in practically every community it is the church that is the most imposing structure.

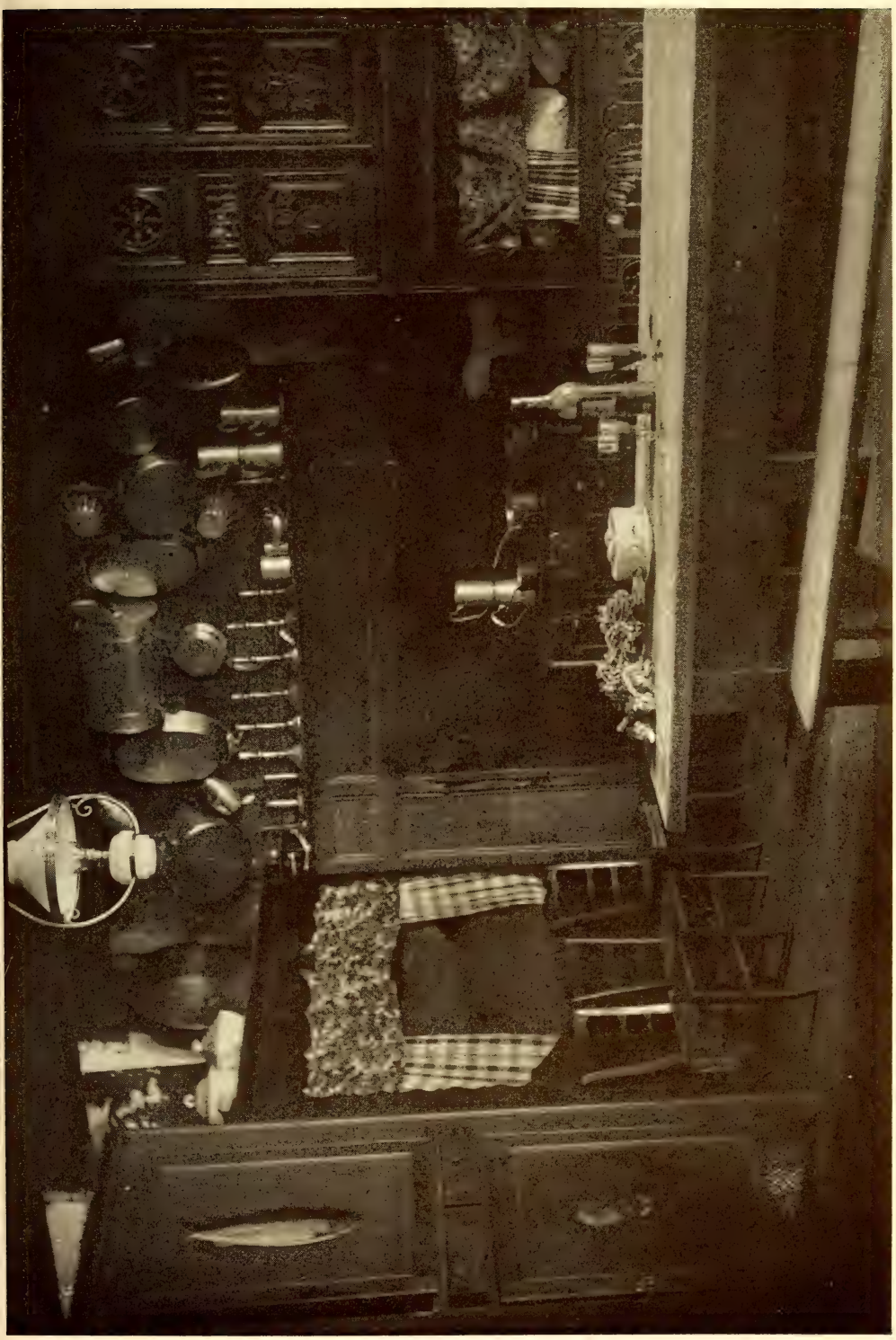
The houses of peasants and fishermen are for the most part small, one-storied, with steep, thatched roof. In a few places I noticed the walls formed entirely of upright granite blocks 7 or 8 feet high. Windows (often without glass) are small, few in number, and not infrequently altogether lacking in the poorest houses.

The floors are of dirt, which is often converted into mud and remains so, and the interiors are usually chilly and cheerless. In many families there is a common bedroom in each house, with a bed in each corner, and it is no unusual thing to find the same room shared by a litter of pigs and perhaps several goats.

Among the better class of farmers we find more pretentious homes, surrounded by substantial stone walls and supplemented by barns and storehouses in keeping with the residence; but even in such a house we may find striking evidence of

A BRETON PEASANT'S HOME

Photo from Hugh M. Smith



THE PRINCIPAL ROOM IN A BRETON PEASANT'S HOME
Note the built-in bed on each side of the fire-place

Photo from Hugh M. Smith

A PEASANT TYPE: MAID WITH WATER PITCHER

SHRINE AND SPRING Photos from Hugh M. Smith

Photo from Hugh M. Smith. Copyrighted by the Century Co.

BRETON WOMEN THRESHING THE GRAIN WITH JOINTED FLAILS, AS IN THE TIME OF RUTH

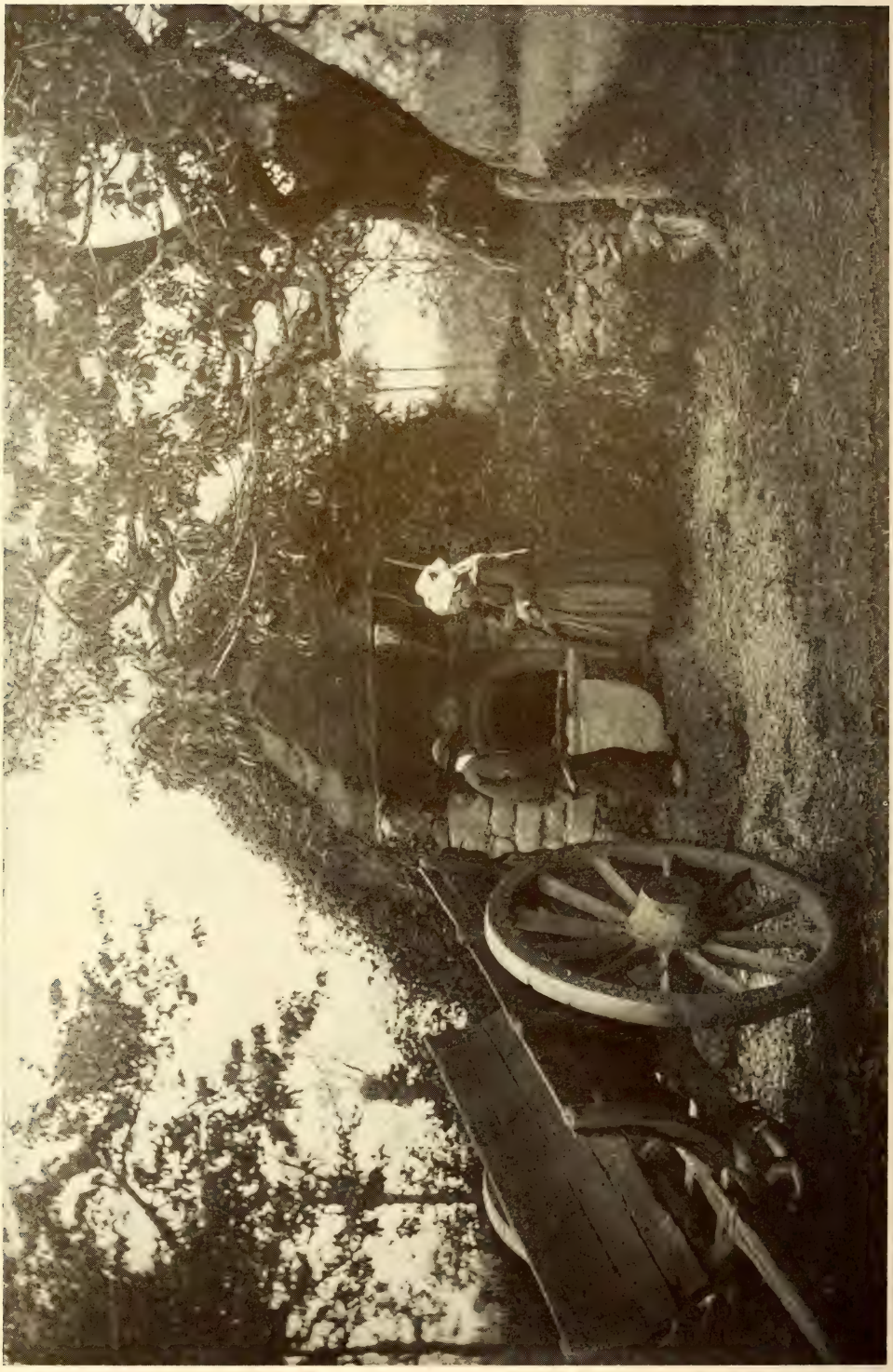
the simple life led by these people—a general living room, with a large, open fireplace to provide heat and means for cooking, and in close proximity a built-in bed.

Wells with massive stone copings are found at most of the larger country houses, and at these wells and in the yards some interesting and picturesque sights may be seen as we pass along the roads. Now and then one comes upon one of those interesting open-air ovens, in which is baked, among other things, the staple food of the peasants and fishermen—a coarse, black pancake made of buckwheat and known as *galette*.

While a large part of Brittany is not suitable for successful tillage, a preponderating percentage of the population have necessarily to engage in some form of agriculture for a livelihood. The coastal regions are the most fertile, and there considerable crops of flax, hemp, and cereals are grown and a limited amount of dairy farming is done. Many goats are kept for their meat, hair, and milk, and most of the peasants have bees, for which they are said to entertain deep affection.

MOST OF THE FARM WORK IS DONE BY THE WOMEN

Perhaps the most impressive feature of rural life in Brittany is the extent to which women and girls perform farm labor that is rarely done except by men among the Caucasian people in our own country. The country districts of this province, as of other parts of France, have been gleaned and scoured for men



OPEN-AIR OVEN AND CHARACTERISTIC COUNTRY CART

Photo from Hugh M. Smith

for the army, and it has become absolutely necessary for the women to carry on practically every branch of agricultural work. It is therefore the rule to find women, and the exception to see men, cultivating the fields, harvesting the grains, digging the potatoes, stacking the hay, threshing the rye, and preparing the farm products for market.

Of course, from one viewpoint, this condition of affairs is not only tolerable but desirable, for one result is the development of a sturdy, healthful race that would not exist if the women and girls lived in insanitary, crowded tenements and spent their days in dark factories or sweatshops. Still, one cannot help thinking how much better it would be if the men were there to do the men's work as we see it, and if the women had a little time to devote to the improvement of the mental condition of themselves and their children, and to the amelioration of the numerous discomforts of their homes, which are cheerless in the extreme.

Many of the farming methods and tools are of the crudest character. The threshing is done with jointed flails, just as in the time of Ruth, and for the winnowing of the grain the most primitive appliances are used. One is now and then surprised to come upon a windmill in the middle of a grain field, but it is a very different structure from the windmill of the Low Countries. Some aspects of the farming, on the other hand, might easily pass muster in Virginia or Pennsylvania, if it were not for the dress of the people and the presence of women on the scene doing work as laborious as any performed by the men.

In the interior districts the carding of the flax that is destined for their pretty caps and collars is done by the women themselves, with the simplest accessories; and likewise the spinning of the yarn for the fishermen's caps, mits, and socks is done after a fashion that is hoary with age.

A RACE OF FISHERMEN

Fishing and the shore industries connected therewith furnish a livelihood to a very large proportion of the inhabitants. With only one-thirtieth as many people as the United States, Brittany has half as many fishermen and one-twelfth to one-fifteenth the value of products. If the fisheries appear to receive an undue amount of attention, I ask you to remember that they are the mainstay of the entire coastwise population. Furthermore, I had rather talk about fishing than any other subject.

The Breton coast furnishes staple water products in great abundance and variety, and is perhaps as highly favored by nature for the support of important fisheries as any other region in the world. In no other country, with the possible exception of Newfoundland, does the success or failure of the fisheries mean as much to the people. It is from among the Breton fishermen that a large part of the best material in the French navy and merchant marine is recruited. In fact, among every five sailors and seamen of France, one is a native of Brittany and in all probability a fisherman by occupation. The fishermen are brave, hardy, hard-working, and competent. Their chief deficiencies as fishermen arise from their conservatism, which sometimes verges on obstinacy, their ignorance, and their superstition, and are manifested in their disinclination to adopt new methods and their tendency to attribute to occult or supernatural influences results that depend on their own efforts or on purely natural causes.

The most valuable of the fishes are the herring, sardine, anchovy, mackerel, and tunny. The tunny is more extensively caught on the Mediterranean shores of France than elsewhere, but quite a large number of Breton fishermen make a livelihood by tunny fishing. Small schooner-rigged vessels are employed, and the active, powerful, voracious fish are secured by trolling, a number of lines being attached to each of six or eight immense poles or rods that are extended over the sides of the vessel while the latter sails to and fro over the fishing grounds.

Among crustaceans, lobsters, langoustes, or spiny lobsters, and shrimps

GATHERING SEA-WEED IN THE SURF DURING A STORM: COAST OF FINISTERE Photo from Hugh M. Smith

are the most important. Brittany supplies France with most of her lobsters and langoustes. They are caught in wicker traps, which differ from the lobster pots used on our New England coast in having a depressed conical shape with the entrance in the top. The lobsters, wrapped in wet seaweed and packed in cheap wicker trays or baskets, are shipped alive all over France.

A short time ago there was an alarming scarcity of lobsters and langoustes on the Breton coast, which was attributable to the octopus. This creature appeared in immense numbers on the fishing grounds, and not only reduced the abundance of lobsters there, but entered the lobster pots and ate the lobsters that had already been caught. As showing the interrelations of aquatic creatures, I might mention that the most potent natural enemy of the octopus is the conger eel, which was formerly abundant, but has recently been very scarce on the Breton coast, owing probably to too active fishing. We thus have the interesting fact that the scarcity of lobsters was in reality due to the scarcity of eels.

THE HARDIEST OF WOMEN

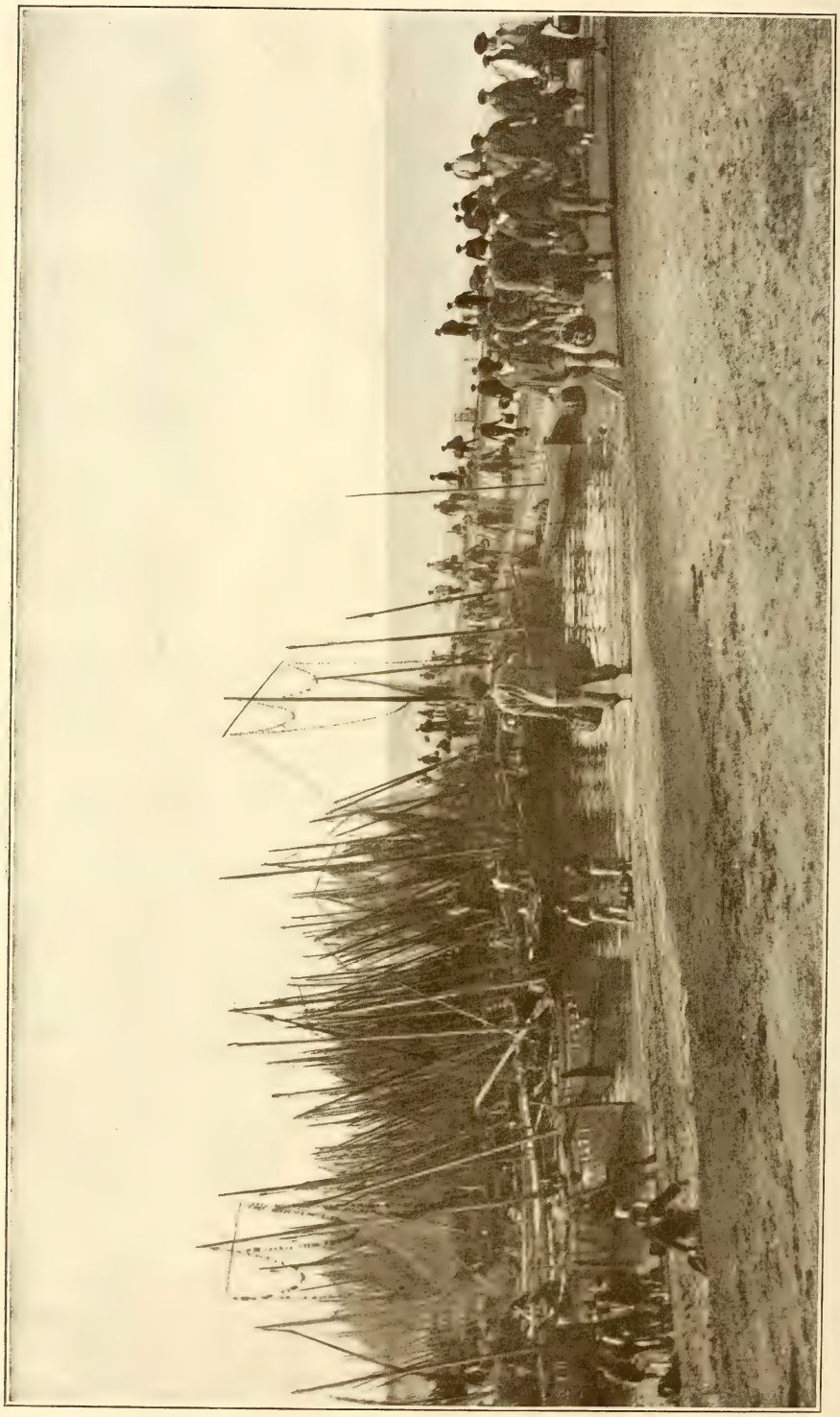
Shrimps are among the most popular of the marine products, and an important fishery is conducted for them, the little creatures being taken in small barrel-shaped traps. Shrimps abound in the coastal waters, and are much sought by women, who wade for them while pushing a triangular net along the grassy bottoms of bays and coves. These shrimpers must be among the hardiest—perhaps the foolhardiest—of their sex, for I have seen them working hour after hour in water that reached to their waists or chests and was entirely too cold for bathing.

France ranks next to the United States as an oyster-producing country, and an important part of the oyster industry is in Brittany. France many years ago discovered a thing that some American States are loath to acknowledge even today, namely, that the oyster crop cannot be harvested for an indefinite period from unplanted grounds. The acceptance of this idea has meant $4,000,000 annually to the French oystermen, whereas the pursuance of the policy that up to a few years ago prevailed in the great oyster regions of our Atlantic coast would have absolutely obliterated the oyster industry in our great sister republic.

Every suitable bay and cove and estuary on the coast of Brittany is utilized for oyster culture, and in 1905 there were over 4,000 oyster-growing establishments in the province. The seed collecting, transplanting, rearing, fattening, etc., are not done in open waters, but in parcs or claires, which are more or less exposed at low tide; and most of the work connected with this industry devolves on women. The output of these oyster parcs in 1905 was 135,000,000 oysters (for oysters in France are sold by number, not by bushels), valued at nearly $600,000. Owing to a variety of causes, among which are differences in habits, the French oysters are not susceptible of the same methods of culture as are ours, but require peculiar treatment and attention, with the result that they are literally brought up by hand, sometimes being actually handled individually as many as twenty times before the crop is finally gathered for market.

6,000 MEN ENGAGE IN THE COD FISHERY

The high-sea fisheries are very important, and are encouraged by the French government through the payment of liberal bounties. On the northern coast of Brittany some 200 vessels, carrying nearly 6,000 men, engage in the cod fishery on Dogger Bank, about Iceland, and on the Grand Banks of Newfoundland. Most of the vessels sail from the port of Paimpol, which you will recall as the home of Loti's "Iceland Fisherman." The hero was a real person, who never forgave Loti for having drowned him in the novel and who was eventually lost, on a return voyage from Iceland, when nearly within the harbor of Paimpol. The annual departure of the cod fishermen in early spring for the far-distant,



A FLEET OF SARDINE BOATS IN PORT

Note the nets suspended from the mastheads to dry

Photo from Hugh M. Smith

"dangerous, icy regions, whose summers know no nights" and their return in early autumn are the most important events in the current history of the fishing towns.

Another important industry connected with the water is the gathering of seaweeds. At certain seasons, after storms, immense quantities of algæ are washed on the shores, and thousands of Breton fishermen, farmers, peasants, and laborers then abandon their business and for a time collect the algæ. They enter the surf with rakes and pitchforks and make great piles of the weed on shore beyond the reach of the waves. The algæ are taken inland and either spread on the land as a fertilizer or dried and burned for the soda and iodine contained in them. The value of the marine vegetables obtained on the coast of Brittany has amounted to as much as $1,000,000 in some years, and that sum would doubtless have been largely increased did the government not restrict the gathering to particular periods, in the belief that at other times damage might be done to fishes and shrimps whose eggs and young are among the algæ.

The manufacture of sea salt by solar evaporation is carried on at various places on the west Breton coast, but is particularly extensive at Le Croisic, where from numerous flooded fields vast quantities of crude salt are gathered annually. This salt is much used in the cod and other fisheries and for general domestic purposes.

THE SILVERY SARDINE

But the leading product of the waters of Brittany is the sardine. This country has its own peculiar attractions for the artist, the archeologist, the linguist, and other specialists, and even ordinary tourists are often impelled to extend their travels thither; but the feature which appeals most strongly to the greatest number of Americans affects not their esthetic, artistic, or scientific tastes, but their gastronomic, through the medium of the canned sardine. Other countries and other parts of France produce sardines, but the sardine par excellence comes from Brittany.

Brittany is the center of the sardine fishery, and has all of the numerous establishments for the canning of the fish. In an average season the Brittany sardine fishermen number 25,000 to 30,000 and catch 100,000,000 to 150,000,000 pounds of sardines, for which they receive $1,500,000 to $3,000,000, while the shore industries dependent on the fishery give employment to 20,000 other persons, mostly women and girls. So important is the sardine that in many communities in Brittany every person is directly or indirectly supported by it, and the failure of the fish to come means ruin, starvation, and death to many people in the more isolated places.

The sardine fishery dates back many years, and even in the early part of the fifteenth century it was quite extensive, but it attained its greatest importance as a result of the perfecting of canning methods and the advent of the railroad in the fishing districts.

A great deal of unnecessary uncertainty and misinformation has existed and still exists with regard to the French sardine. It has long been known that the little fish canned in France is not a species *per se*, but is simply the young of the pilchard, which is one of the most valuable and abundant fishes of the south coast of England. The range extends from Sweden to the Madeira Islands and includes the Mediterranean Sea. The name "sardine," as you have no doubt surmised, has reference to the island of Sardinia, about whose shores the fish is abundant.

Sardines are found on the coasts of Brittany throughout the year, but occur in greatest abundance in summer and autumn. The small fish, in demand for canning purposes, have been hatched from eggs laid in the previous summer at a considerable distance from the land, and go in schools at or near the surface. As many as 100,000 have been taken at one time in one net from one school, but the usual size of the schools is not remarkably large.

THE PROSPERITY OF BRITTANY DEPENDS ON THE SARDINE

Like other free-swimming oceanic fish, of which the mackerel, bluefish, and herring are conspicuous examples, the sardine varies in abundance from year to year, and at times has been exceedingly scarce on the French coasts. Thus, from 1887 to 1890 there was an alarming scarcity, but after this four-year period the fish returned in as great numbers as ever. Again, from 1902 to 1906 the sardine disappeared almost completely, only to be followed by a period of great abundance. All sorts of theories have been advanced to account for these periods of scarcity, which appear to be coming more frequently than formerly and are giving the French government and people much concern. Among the causes assigned are over-fishing, the ravages of other fishes and of whales, the explosion of submarine mines and torpedoes in the French naval maneuvers, and divine providence.

It is difficult for us to realize what the failure of the sardine fishery means to the inhabitants of Brittany, for nowhere in our country has the failure of a fishery produced anything like the same results as in this little French province. Remembering that fishing is the principal occupation of the people, that the sardine is the principal fish, and that the fishery and the canneries bring in most of the money, you may be able to appreciate how it is possible in the winter following several poor seasons for 20,000 fishermen and 60,000 women and children to be in a state of actual starvation, with absolutely no means of helping themselves and dependent on the bounty of the government and private persons of means. The pitiable plight of the Breton fishermen and factory hands and their families has been told again and again during the present generation and the harassing tale has aroused the sympathy of all civilized countries.

The fishery is conducted with small, wide-beam, open boats, carrying two rather tall masts, each with a large, square lugger sail. The boats are propelled also by oars, which are of an exceedingly clumsy type, the blade being small and narrow, while the shaft is square and four inches in diameter. The length of the oars is extraordinary, averaging 33 feet, and as only one man plies each oar, we often find heavy stones tied on the butt in order to counteract the weight of the long shaft and blade.

In the early days of the fishery, nets were employed to surround the schools of sardines, and then stones were thrown to frighten the fish into the meshes. In this way large catches were often made and the markets were glutted, so the method came into disrepute and is no longer followed. Fishing is now done exclusively with gill-nets made of fine cotton twine; the nets are 45 yards long and 500 meshes deep, and the complement of each boat is 10 nets, representing 3 degrees of fineness, adapted for small, medium, and large fish. The nets are kept in position in the water by means of numerous cork floats and a few large stone sinkers.

A peculiar thing about the nets is that by means of an anilin they are dyed a bright greenish blue. This is for the purpose of preserving them and of rendering them less conspicuous in the water. When the nets are suspended from the mastheads to dry, they add greatly to the picturesqueness of the fishing boats and the wharf scenes.

Sardines are caught more or less throughout the year, but fishing is largely suspended from December to February, and the most extensive fishing is in summer and autumn. The boats start out early in the morning, so as to be on the ground when day breaks. The best fishing is then had, and the boats are often back to port by 9 or 10 o'clock with full cargoes.

When a boat arrives on the grounds the rear mast is taken down and the craft is headed toward the wind. If there is no wind, the sails are lowered and the boat is rowed by the four members of the crew. A net is put overboard and is slowly towed behind the boat by means

of a short line. When fish are abundant the fishermen often let one net go adrift when it is full of fish, trusting to pick it up later, and put out another net. The sardines are often found in a compact body containing hundreds of thousands or perhaps millions, and the boats will be concentrated in a comparatively small area, at times so close together that the operation of the nets would seem almost impossible and the chance of catching fish very improbable. The entire fleet of a given port, consisting of several hundred boats, may be at work on one shoal at one time.

SARDINE CANNOT BE CAUGHT WITHOUT BAIT

There are several features of the fishery that are most exceptional, not to say anomalous. One of these is that, notwithstanding the fish are caught in gill-nets, bait is used in large quantities and is indispensable. In no other net fishery in the world is bait so extensively employed or so essential to the success. Various things have been and still are employed for this purpose, but the bait now in general use is the salted eggs of the codfish, although any other small eggs will answer just as well. The reason cod eggs are used is that they may be obtained in immense quantities.

The casting of the bait, on the proper use of which a great deal of the success of fishing depends, is always done by the captain, who stands on a little platform in the stern and, while directing the movements of the boat and the manipulation of the net, throws the bait to attract the fish to the surface and around the boat. When the fish are on one side of the net or the other, his next move is to cast the bait in such a way as to cause them to rush against the net and thus become gilled.

Considerable skill and experience are required in having the net hang properly in the water and not become folded or wavy, owing to currents or tide, for unless the net is straight or only slightly curved, it will be seen by the fish and avoided.

When a net contains fish it is hauled into the boat and the catch is removed by gentle shaking or by hand. The delicate fish are put in a compartment in the bottom and are handled with great care, so as to avoid crushing and bruising. As no ice is used for preservation, it is important that the boats reach port as promptly as possible, and almost invariably the fish are landed in excellent condition, and are often delivered at the factories within an hour or two after capture.

The sardines are sought and found rather close to shore, thus permitting the use of small boats, and the landing of the fish a short time after capture is insured. Most of the fishing is done inside the bays and within two or three miles of shore, and only rarely is it necessary to go as far as ten miles from land.

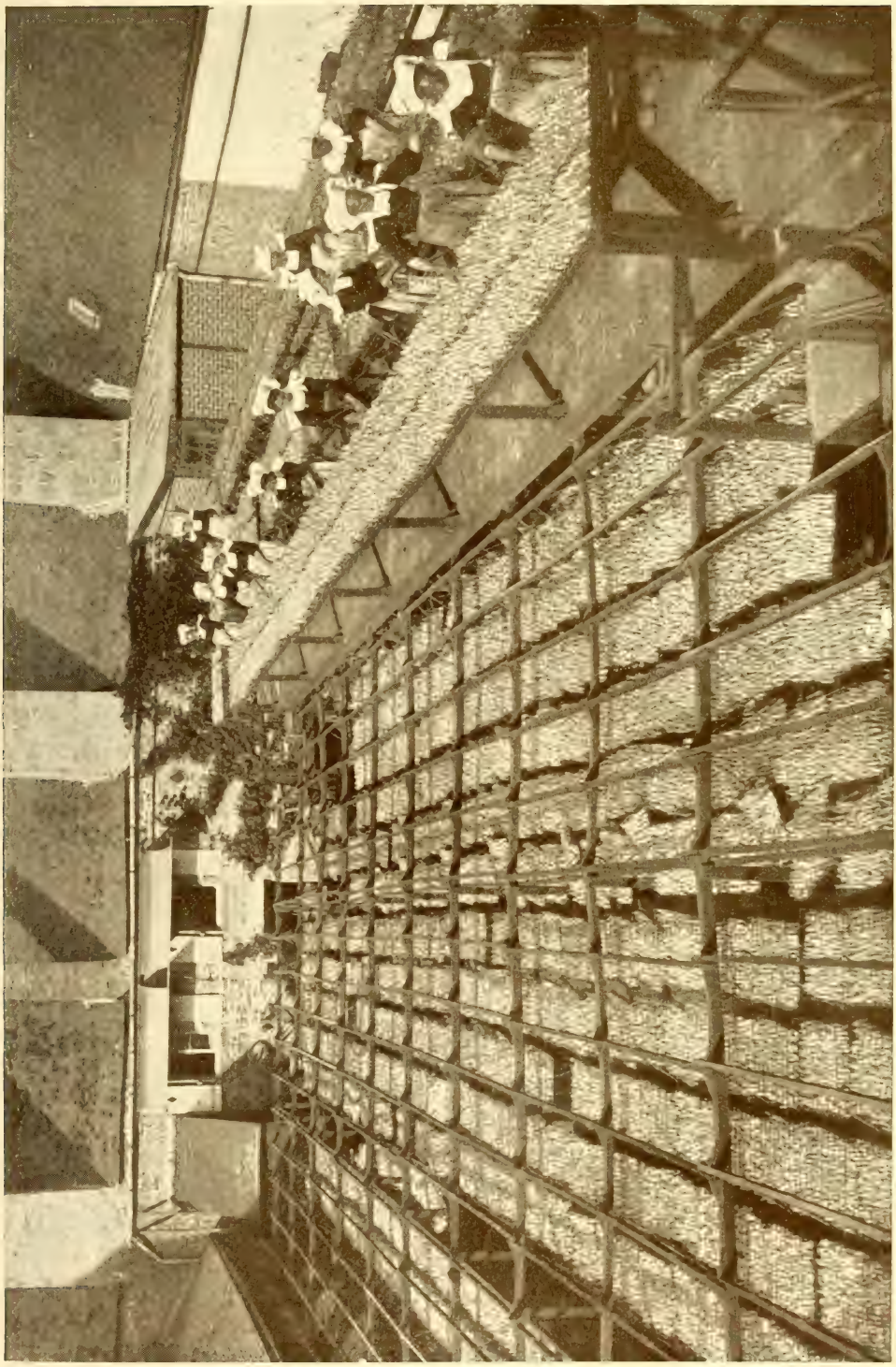
THE SUCCESS OF THE SARDINE FISHING SEASON DEPENDS ALMOST ENTIRELY ON GETTING BAIT FROM NORWAY

Another remarkable fact regarding this fishery is that the indispensable bait is not a home product, but has to be imported at great expense, and therefore this most valuable fishery of France is absolutely dependent on the fishermen of other countries and its success is intimately related to the outcome of fisheries for other species in far-distant waters.

The annual consumption of cod roe for bait is from 40,000 to 50,000 barrels, and for this the Breton fishermen pay about $350,000. The greater part of the bait comes from Norway, where for at least two centuries the cod fishermen about the Lofoden Islands have been salting what would otherwise be a waste product and selling it at lucrative prices to the Bretons. Small quantities of this roe have been contributed by Newfoundland, Holland and the United States; but efforts to induce the French cod fishermen in Newfoundland, Saint Pierre and Miquelon, Iceland and the North Sea to save this product have been futile, notwithstanding that as early as 1816 the government offered French fishermen a

Photo from Hugh M. Smith

WOMEN OF BRITTANY ASSORTING AND ARRANGING SARDINES FOR DRYING IN A CANNERY



VIEW OF A LARGE CANNERY IN BRITTANY, SHOWING SARDINES DRYING ON GRILLS Photo from Hugh M. Smith

bounty of $4 a barrel for roe bait prepared from fish caught by them.

How serious and anomalous this condition of affairs is may be judged when it is stated (1) that a season of great abundance of sardines may find the fishermen with an inadequate bait supply, which greatly reduces the catch and the profits of fishing; (2) that during periods of great scarcity of fish, when to even exist may be a difficult matter, the cost of bait may be almost prohibitive; (3) that the Bretons are apparently willing to pay to the Norsemen a heavy tribute, which during one entire decade in the nineteenth century was never less that $32 a barrel and at times reached $60 a barrel for cod roe; and (4) that the Norwegian government, by prohibiting the exportation of cod roe, could ruin the sardine fisheries of Brittany and place practically the entire population in a starving condition.

When the fishing boats begin to arrive the wharves, which have practically been deserted, assume a very busy appearance, and as the arrivals increase in number the bustle among the different classes of people becomes intense. The foreign visitor here witnesses some exceedingly interesting and picturesque sights—thousands of fishermen in their coarse blouses and flat caps, with trousers rolled up and their feet bare or in huge wooden shoes, unloading their fish and carrying them to the canneries; hundreds of women and girls in their short, dark skirts, white caps and collars, negotiating for sardines, receiving them from the fishermen, and dispatching them to the canneries; sardine boats, either sailed or rowed, entering the harbor in groups or singly and coming up to the docks, already so congested that some of the boats must land directly on the beach; fish wagons going to and from the factories; and a mixed crowd of merchants, sight-seers, artists, and idlers. The commingled noise of waves, boats, wagons, and tongues is underlain by the incessant rattle of wooden shoes on the stony pavements.

Soon after the boats reach port the nets are spread for drying, being hoisted to the tops of the masts for this purpose. When all the fleet has arrived and the nets are hanging in graceful festoons, the view of the maze of masts, sails, and blue nets is most striking.

PECULIAR DIVISION OF THE EARNINGS

It may be a matter of some interest to learn something about the financial side of the sardine fisherman's life. The prices received for the catch depend on supply and demand and on the size and quality of the fish. The fish of each boat are virtually sold at auction to the highest bidder, but there is little counter-bidding, as the prices offered from time to time by two or three canneries are adopted by the others and accepted by the fishermen. Some boats always sell to the same cannery, and all of them, to a greater or less extent, deal with particular factories.

The maximum price that factory operators can profitably pay for sardines is $5.00 per thousand. Taking an average season through, the prices received by the fishermen would be $3.50 to $4.00 per 1,000 for the largest sardines (many of which are consumed fresh), $1.50 to $2.00 per 1,000 for the medium-size fish, and $0.50 to $1.00 per 1,000 for the smallest fish.

The fishermen are not paid in cash, but with tickets or tokens that are redeemed weekly. The men fish on shares, and the apportionment of their lots is complicated enough to puzzle a Philadelphia lawyer and to make expert arithmeticians of the entire population. To illustrate: Each week the gross earnings of each boat are divided into 22 parts, or shares, of which 11 go to the owner of the boat and equipment, 2 to each of the four fishermen, 2 to the master, and 1 to the cook; but the master receives a bonus of 10 per cent of 2 shares, and to compensate for this the shares of each of the four fishermen are diminished by 2½ per cent. These are the very simplest terms in which I have been able to state this arrangement.

BRETON WASHERWOMEN (SEE PAGE 565) Photo from Hugh M. Smith

In ordinary seasons, boats that fish regularly will earn from $400 to $1,200, averaging, perhaps, $600 or $700.

WOMEN DO MOST OF THE WORK IN THE CANNING FACTORIES

It is not needful for us to look into the details of the sardine canning industry, but there are a few points of general interest to which we may devote a few words.

The construction of the first canning establishments dates from 1845, since which time the growth of the business has been uninterrupted and rapid. More than 100 canneries are now in operation, and the output in ordinary years is tremendous, the pack of some of the largest factories being 5,000,000 boxes each.

Practically all the work about the factories is done by women and girls—at good wages. With deftness and expedition they remove the heads and viscera from the sardines, soak the fish in brine, place them in wire baskets or on wooden trays to drain and dry, immerse baskets and fish in boiling oil, pack the fish in tin boxes after cooling, insert spices of various kinds, then fill the boxes with oil, seal them, and put them in vats of boiling water for two hours (to complete cooking, soften the bones, and kill bacteria).

THE CAPITAL OF THE SARDINE INDUSTRY

The chief center of the sardine industry is Concarneau, a town of 10,000 people, of whom 3,500 are sardine fishermen and 3,000 are men, women, and children in the sardine factories. Some of the canneries are operated by American citizens and with American capital, and representatives of foreign dealers in French sardines have their offices here.

Concarneau is a very ancient place and shows the scars of a checkered

BRETON PEASANTS Photo from Mrs Fairchild

career. It has sustained sieges, bombardments, pillage at the hands of the British, and was occupied more than once by these hereditary enemies of the Bretons. In 1377 it was held by a British garrison, all of whom were put to death by the great Duguesclin.

In modern times the town has outgrown the wall and moat that surrounded it and has spread along half a mile of water front, and it has become one of the most attractive places in Brittany for the tourist and artist. No art gallery is now complete without "A Roadside Well in Concarneau," or "A Street Scene in Concarneau," or a "Return of the Sardine Fishermen"; and some of our local artists have brought back some charming sketches. It is, I believe, a fact that no other fishing town in the world has, through the faces and figures of its people, been so extensively represented on canvas.

Perhaps the influx of Americans is due in part at least to the fact that an American woman wrote a novel with Concarneau for its setting. Patriotic feelings impel Americans to read the book, and to accept with credence all that the local guides are able to tell about the characters therein, not the least interesting of whom was the fair authoress herself, who appears to have been the autoheroine of the story.

Photo from Hugh M. Smith

A LITTLE FIFTEENTH CENTURY CHURCH IN CONCARNEAU

Filled with votive offerings from the fishermen. The sunny side of the church and the base of the calvary are favorite places for the women to gather to gossip and knit

At Concarneau we may see most of the Breton industries and customs to very good advantage. In a month's visit to Brittany we might profitably spare a week or ten days for sight-seeing in this town and its immediate environs, and at the end of that time we should probably be loath to leave, even if Paris called. To many people the gay capital would have few charms or attractions superior to those offered by this remote little town on the Bay of Biscay.

The churches of Brittany are the magnets to which every heart turns in every community, and it was not surprising that in Concarneau some of the most interesting sights should have centered in and about a plain little church on the

Photo from Mrs Fairchild

THE PROUD PURCHASER OF A PAIR OF WOODEN SHOES

water front, dating from the fifteenth century. I never failed to find a group of women knitting about the doors. From the ceiling near the altar is suspended a large model of a full-rigged vessel presented by a fisherman to satisfy a vow when saved from shipwreck, and on nails and posts about the altar hang several score of china arms, hands, and legs, about half natural size, presented by fishermen and others in gratitude for recovery from disease of those parts.

Near by is a large cross, or "calvaire," which is likewise a great place for loitering, knitting, and gossiping. When the excavation for the foundations of this cross was being made, in 1883, twenty skeletons of men of large size were found, and it was generally believed that they represented English soldiers who had died in one of the numerous attacks on the old closed town.

Market-houses are rarely found in the towns and villages, and the business that is usually done in such places is in Brittany conducted in the open air. Isolated vendors may be seen with their wares in the streets at almost any time; but there are certain days when the farmers' wives come in from the country and are joined by the merchants' wives from the town, and their goods of all descriptions are displayed on the ground, rarely in booths, in a plaza, park, or street set apart for the purpose.

I was awakened in Concarneau early one Saturday morning by a great babel of voices and clatter of wooden shoes

GOING TO MARKET: BRITTANY Photo from Mrs Fairchild

outside the hotel, and I saw from my window an extensive market that had come into existence since the previous evening. Every imaginable local product was exposed for sale—pottery, cutlery, shoes, clothing, vegetables, grains, fish, cattle, poultry, etc.—and each stand or booth was in charge of a woman. The townspeople soon gathered in large numbers, and most animated bargaining and gossip began. This market was continued on Monday, and was participated in by a large number of vendors.

A peculiar round-bottom cart is used by the farmers for hauling all kinds of

truck, but I suspect that the cart is constructed primarily for the accommodation of barrels of cider—a product extensively made in the country districts and extensively consumed in the villages and towns.

The Breton women are very industrious and are seldom seen idle, even when not at their vocation. While resting at home, while waiting about the wharves or farms, and even while walking along the streets and roads, they may usually be seen busy knitting jackets, socks, caps, etc., with most nimble fingers.

The elderly women are particularly fond of impromptu knitting bees, at which conversation never lags. The vehemence with which they then dissect their neighbors, exchange gossip, and discuss village affairs is astonishing, and the language then used is very much coarser than is sanctioned by Parisian etiquette or is employed in their ordinary conversation. Favorite places for their gatherings are the sunny side of a church and about the base of a calvary. As one passes along a country road or a path overlooking the sea, he often comes upon groups of knitting, talking women.

It was always a source of wonder to me to see how scrupulously clean were the caps and collars of the women and girls even when they were engaged in the dirty work about the sardine canneries, and it was likewise a source of wonder that during the fishing season they should have any time in which to attend to their laundry work. I do not know whether in the coast towns there are large numbers of professional laundresses or whether each woman or girl is her own laundress on occasion, but I do know that one meets a surprising number of washerwomen on the country and suburban roads and often comes upon large parties of such women at work.

Washing is done in the open air, on the edges of brooks and ponds, sometimes under the cover of a shed which has probably been erected by the village or town, but more frequently under the sky. Each woman kneels in a little three-sided box resembling the body of a child's wheelbarrow, and has as a washboard a piece of flat stone between the box and the water's edge. The actual work of washing is allowed to interfere but little with conversation, and hence it often happens that one's ears rather than one's eyes first detect the presence of these parties. In the wild moorlands and other places where other facilities are lacking the washing may be carried on in mere ditches, the women standing in the water.

Round the town of Concarneau are numerous curious Druidical remains, including many upright monoliths, or menhirs, in a large tract of country known as "The Place of Grief and Mourning." There are also dolmens, as the horizontal monuments or prostrate menhirs are called. Both of these words are Armorican, and the syllable *men* in each means stone.

It is hardly necessary to say that the Breton peasants and fishermen regard these stones as of supernatural origin, and their childish imaginations ascribe to them all kinds of occult influences. Many a Breton fisherman has satisfied the anxiety of his wife at his failure to appear until the morning after by relating how, on his way home the night before, he sat down to rest at the base of a menhir, and, having fallen into a gentle sleep, he awoke to find that a curious dwarf had taken him inside the stone and kept him there until the sun rose. One of the fishermen told me that to have this interesting experience it was necessary for a man to imbibe a certain amount of liquor, as the dwarf could hardly be expected to appear to a perfectly sober person.

In the vicinity of the village having the suggestive name of Carnac, there is an area thickly strewn with gigantic stone monuments in eleven long lines. The church and most of the houses in Carnac are constructed of these mysterious stones. In the contiguous district, nearly forty miles wide, dolmens and menhirs may be met with everywhere, and one prostrate menhir is sixty-four feet long.

All of the stones were erected in connection with burial and the subsequent worship of the dead, and in this cardinal

A GIGANTIC MENHIR Photo from Mrs Fairchild

feature of the religion of the aboriginal inhabitants some students have seen a strong and suggestive analogy to the ancestor-worship of the Chinese.

These wonderful remains of an extinct civilization occur in all parts of the country. Hundreds of thousands must have been destroyed, but they still constitute the characteristic feature of the landscape. As we stand among them we can sympathize with the ignorant and superstitious peasants, who have weaved curious romances around, and who still perform strange rites among, these relics that, in their judgment, could have been erected only by supernatural powers.

The Bretons are a serious people, and their temperament, their environment, and their vicissitudes have produced just such a soberness of demeanor as we should expect. Most of their diversions are connected with their religion, but they have some pastimes in which they engage with great spirit.

The day following a religious fête is often dedicated to fun and sports and mild dissipation. There may be barrel races for boys, wrestling matches for men, dancing for men and women, and hard cider for all. The Brittany dances are among the most interesting institutions of the country. They are held in the open air—on a town street, in a village square, on a roadside, or in a field in the country.

A dance that I attended in a little village in the interior of Finistère was typical, and was participated in by about forty men and women, all clad in the peculiar garb of the district: the men with a flat, haircloth hat with rolling brim and a black velvet band continued down the back as two long streamers, and with the black jacket and vest trimmed with black velvet; the women with long, beautifully embroidered aprons and elaborate white bonnets. The most celebrated and characteristic

AT A PARDON IN CONCARNEAU Photo from Hugh M. Smith

The image of the patron saint is carried on a platform by women wearing white dresses and bonnets and beautiful lace shawls

of the dances is the gavotte, which is often participated in by several hundred people and lasts for two hours or longer. Music for the dances is always furnished by a pair of artists, usually perched on barrels, one playing a bagpipe, the other a flageolet.

THE PARDONS

The other day a critical friend of mine objected to calling Brittany "The Land of the Sardine" because, as he said, sardines do not live on land. This reminded me that a Breton would undoubtedly refer to his native country by another name—he would call it by the expressive and characteristic term of "The Land of the Pardons."

The significant name of *pardons* is given to those religious fêtes which are held on the day devoted to one of the numerous saints in the district where is centered the worship of that particular holy personage. Some of the pardons are very celebrated and are attended by thousands of people, many coming from long distances; some are observed only in a circumscribed district or parish, and others are confined to the worshippers at a particular chapel or shrine. Those who participate in these fêtes expect to receive forgiveness for past sins and indulgence for future ones. It is at the pardons that the Bretons are always seen at their best and frequently at their worst; for the deep religious feeling and solemn exercises are immediately followed by a sharp reaction, and there is a general yielding to the national vice of drunkenness.

Photos from Hugh M. Smith

PARDON ON THE FEAST DAY OF THE PATRON SAINT AT SAINT GWENOLE, BRITTANY

Photo from Hugh M. Smith

A PARDON IN CONCARNEAU

The procession on the water front, with sardine boats at the dock

A PARDON IN CONCARNEAU: ANOTHER PART OF THE STREET PROCESSION Photo from Hugh M. Smith

Few, if any, among the modern French writers understand the Breton character and language better than Anatole Lebraz, one of whose works, *Au Pays des Pardons,* is devoted to an account of the various pardons celebrated in Brittany. A Breton himself, he has a keener insight into the traits of these people and a deeper sympathy with their beliefs, habits, and customs than an outsider could have.

The pardons are conducted today just as they were centuries ago, and no one not to the manner born can appreciate their full significance to every Breton man, woman, and child.

"It is, in fact, impossible to overestimate the importance in the life of the true Breton of the pardon of his parish, for from his earliest childhood it is associated with the most solemn moments of his existence. As an infant, he is carried by his mother to the church or shrine which is the point of departure of the procession; as soon as he can walk he is allowed to take part in the latter, and he tramps happily along with his playfellows of the village, never owning to weariness, however long the pilgrimage; and when he is old enough he competes eagerly for the honor of carrying one of the banners. It is often at a pardon that he falls in love with his *douce,* as he poetically calls his sweetheart, and it is generally at the dance in the open air that follows the completion of the religious duties of the day that the final words are spoken binding him to her for life.

"It is at the next pardon after their betrothal that the affianced pair win a blessing on their union, and it is at a pardon that they return thanks for the birth of their first child. The sailor or fisherman who has attended a pardon on the eve of a voyage feels secure from the perils of the deep; it is at a pardon that the peasant prays for the fertility of his little holding. To the women of Brittany the annual ceremony is the one event of the year; the dress to be worn at it occupies the thoughts of the young for months beforehand, and large sums are often expended on it; whilst to the old it is a time sacred to memories of the past, when the spirits of those that are gone seem to be present once more, and the days of their own girlhood are recalled, when to them, as to their grandchildren of today, all things seemed possible."*

The pardon that is celebrated with special zeal in the coastwise regions is that of the fishermen and sailors on Saint Anne's day. The people from the different parishes and from adjacent districts assemble in their characteristic costumes and with their sacred banners and relics.

The procession starts from the church and traverses the main streets, the rich banners borne by men and women at the head of different detachments and the images of patron saints carried on a platform by women in special dress. A prominent place in the procession is occupied by those who have been saved from wreck and drowning, and these are followed by the widows of lost sailors and fishermen.

One of the events of special interest that we may witness is the arrival of a party from one of the outlying islands, where, owing to storms, the inhabitants are sometimes isolated for weeks at a time. It is among these insular people that the ancient customs and beliefs persist most strongly, and it is on an occasion like this that we may discover new features of interest in the dress, speech, and manners of the Bretons.

Those who go to Brittany to find sublime or awe-inspiring scenery will be disappointed, for there is none; but those who are satisfied with quiet sights will find much that is most pleasing and attractive.

The waters that wash the shores of Brittany are proverbially boisterous, and the Bay of Biscay in particular is liable to fierce storms. The much-broken coast is skirted with many protecting islands, which, like the mainland, are rocky and in some places quite precipitous. The huge promontory of Finistère might easily pass for the sister promontory in Cornwall, and the extremity of Finis-

* Bell's "Picturesque Brittany."

tère, Pointe du Raz, strongly suggests the Land's End region and is probably the most rugged part of the coast.

Those who enjoy pastoral scenes will find pedestrian and carriage trips along the country roads of Brittany far from dull, especially if one has enough imagination to enable him to enter for a moment into the lives of the diverse types of humanity he will see as he passes along, and if he remembers enough of Breton history and archeology to appreciate their significant relations to landscape and people.

The public roads, some of them dating from the Roman conquest, are, as a rule, excellent. Many of them are of that peculiar type so common in Cornwall and so conducive to the sanguinary guerrilla warfare that has often been waged here—that is, the roadway is separated from the fields and woods on either side by high banks of earth or stone or both, overgrown with herbage and often supporting trees or dense hedges.

To satisfy any longings one may have for the antiquated—and we Americans are particularly prone to rave over ancient structures and ruins because we have none at home—one now and then has an opportunity to visit a feudal castle that was already old when the news of the discovery of America was first brought to the Bretons.

WHEN OUR COUNTRY IS FIFTY YEARS OLDER*

By Raphael Zon, of the U. S. Forest Service

IN the last analysis all material wealth, all the comforts and necessities of life, are the product of two elements—nature and labor. It may be truly said that nature, or the earth, is the mother of labor the father of all products necessary to sustain human life. The richness and prosperity of a country, therefore, depend on the presence of natural resources within its borders, such as water, minerals, forests, and cultivable soils on the one hand, and intelligent human enegy on the other to shape them into the forms necessary for the needs of man. Of the two elements the natural resources are indispensable, for in a country like the Desert of Sahara all human effort would be of but little avail. The growth of a nation depends, therefore, upon the extent of the natural resources and upon the knowledge of how to use them with as little destruction as possible.

The resources of a country fall naturally into three groups—water, minerals, and land—which represent, respectively, resources which are inexhaustible, resources which are exhaustible and cannot be renewed and resources which are exhaustible but can be renewed.

It may be questioned, indeed, whether there is such a thing as an inexhaustible natural resource. Even water, through the denudation of the drainage basins, may become irregular in its flow, or through the careless disposal of refuse may become polluted so that it cannot be used. Mines are illustrations of resources which are exhaustible and not renewable. Gas, oil, coal, and iron once gone are gone forever.

Of all the natural resources the only one which contains within itself the possibility of infinite renewal is land. The nation should therefore be most vitally concerned with the conservation and improvement of this resource. Human control over such natural resources as minerals is limited. The only possible means of conservation is the avoidance

*Abstracted from "The Future Use of Land in the United States," by Raphael Zon. Forest Service Bulletin 159.

of waste, but their ultimate exhaustion is unavoidable. With agricultural and forest land, however, it is otherwise. Land cannot only be conserved, but constantly improved and its yield increased. While in England the iron ores and the coal are becoming constantly harder to get and their exhaustion is threatened, the agricultural land, after a thousand years of cultivation, is now more productive than ever. The wheat fields of England under intensive cultivation yield 30 bushels to the acre, while the virgin fields of America on an average yield less than 13.

If a far-sighted national policy in the conservation of natural resources is to make provision for an ever-increasing population, then the greatest possibilities lie in the direction of developing the land in all its forms—field, forest, and range—for, notwithstanding all possible economy in the use of the non-renewable resources, they are bound to decrease as time goes on.

THE USES OF OUR LAND WILL CHANGE GREATLY

One hundred years ago the United States east of the Mississippi River was an almost unbroken forest, comprising something over 1,000,000 square miles, or about 700,000,000 acres. Now, after about a century of settlement, there are not more than 300,000 square miles of merchantable forest land in the eastern United States. About 330,000 square miles have been cleared for farm land. The remainder has been culled of its valuable timber and devastated by fire or else turned into useless brush land. With the growth of population and the greater demand for agricultural land, the ratio between farm and forest land will change still further. The forests will be more and more crowded into the mountains and upon soils too thin or too poor for agricultural purposes. It may be safely assumed that in fifty or one hundred years the proportion of land devoted to the different purposes will change almost as much as it has during the past century. These changes will occur especially in the eastern part of the United States, because there the forest is not confined, as it is in the West, to high altitudes, where agriculture is generally impracticable. In the West the forests, with a few exceptions, as in the low country around Puget Sound, are in the high mountains, which rise in the midst of semi-arid plains, and their original area of 150,000 square miles, half of which lies in the Sierra Nevada and in the Cascades and half in the Rockies, has changed but very little since settlement. In the West the increase of agricultural land must be secured chiefly through the irrigation of the semi-arid land.

If we take a long look ahead into the future and try to picture to ourselves what will be the ultimate proportion of farm, forest, range, and desert in this country fifty years from now, in the light of the increasing demand for agricultural land and of an approximate knowledge of the climatic conditions and the physical properties of the different lands in this country, we shall get something like the condition shown in the diagram on page 575.

ONE-HALF OF THE UNITED STATES WILL BE CULTIVATED

The area devoted to agriculture in a half century, instead of being 21 per cent of the total area, as it is now, will be nearer 50 per cent. That this is not an overestimate is indicated by the fact that during the last fifty years the improved farm land in this country has advanced from 113,000,000 acres to 415,000,000 acres, an increase of nearly 370 per cent.

With more intensive methods of cultivation larger yields will undoubtedly be obtained from the same area, yet the area itself under agricultural crops will have to be increased, especially if we are to remain an exporting country.

In Belgium the arable land forms 63 per cent of the total land area, in Denmark 68, in France 48, and in Germany 47. These countries are not exporters of cereals, although their methods of

DIAGRAM SHOWING THE PROBABLE USES OF THE LAND OF NORTH AMERICA 50 YEARS HENCE

cultivation are highly developed. France is especially interesting as a criterion, because its methods are most intensive and it is the only country that is self-sustaining; it produces 98 per cent of all the cereals which it consumes. There is little doubt that our population in the next fifty years will reach at least 150,000,000, or about 50 persons per square mile. Whether the acreage of improved farm land will increase at a much faster rate than the population, as has been the case in the past, or whether it will grow at the same or even a slower rate than the population, the future alone can tell; but increase it must.

In mountainous Switzerland only 17 per cent of the land is cultivated, and in

Photo from U. S. Forest Service

REDWOOD CUT ON VANCE'S PROPERTY, HUMBOLDT COUNTY, CALIFORNIA

Sweden and Norway, situated in an unfavorable climate and with a scanty population (29 and 18 persons per square mile, respectively), the proportion of arable land is 8.7 per cent and 1.3 per cent, respectively.

OUR NATURAL RANGES WILL REMAIN THE SAME, BUT THEIR PRODUCTIVENESS WILL BE VASTLY INCREASED

Land chiefly valuable for grazing will form about one-fifth of the extent of the United States proper. This land originally lay west of the one hundredth meridian, in the plains and mountain valleys, but with the advance of dry farming its eastern boundary has been shifted farther west to about the one hundred and third meridian. This land receives but a scanty rainfall and can produce neither forest nor field crop, but supports a vegetation of hardy grasses. It was formerly the natural range of millions of buffalo and is now the grazing ground of herds of cattle and sheep. This land will remain largely a natural range, since the area which can be irrigated, and thus reclaimed for agricultural purposes, or which can even be used for dry farming, is comparatively small.

According to government estimates, the available water will be sufficient to irrigate 71,000,000 acres, or 1 acre in 7½ of the entire region. The Reclamation Service, however, does not expect to reclaim more than 5 per cent of all the arid land. This area, together with that used for dry farming, will barely suffice to counterbalance the reduction of the productive area in the United States through the growth of cities, the building of railroads, and the general development of commerce and non-agricultural industry. The possibilities for increasing the productiveness of the 300,000,000 acres of our public grazing land are very great.

About 2 per cent of the total land area will forever remain desert. There are but few areas within the United States which, on account of the intense heat, very low temperatures, alkali, or lack of rainfall, are unfit for the use of man and may be truly considered desert land. Such land is found in the Southwest about the Gulf of California, in Nevada, in Utah, and in Oregon in the form of arid basins. Ice-bound deserts are found in Alaska and on the glacier-covered mountains. This land must, so long as the climatic conditions of the country continue as they are, remain unproductive.

WILL OUR FORESTS BE SUFFICIENT FOR OUR NEEDS

The land chiefly valuable for growing forests will shrink to about 360,000,000 acres, less than one-fifth of the extent of the United States proper. Together with the wood lots, which will continue to form part of the farm land, the total forest area will amount to approximately 450,000,000 acres, or a fourth of the total land area.

Will this area be sufficient to provide a population of 150,000,000 people with all the timber needed for construction, ties, poles, pulp, and all the various uses for which wood seems to be the only suitable material, and to protect the soil from erosion, regulate the stream flow, and exert its wholesome influence upon the lives of the people?

With the exception of those countries which have naturally a humid climate, like Great Britain or the Netherlands, the countries with a forest area of only 20 per cent or less show usually to a marked degree bad climatic conditions, with prolonged droughts, frosts, and alternating floods and low water, as a result of the reduced forest area. Portugal, with a forest area of only 3½ per cent of the total; Spain, with 16 per cent; Greece, with 13 per cent; Turkey, with 20 per cent; and Italy, with 14 per cent, are good examples.

While the area absolutely necessary for the regulation of streams and the protection of soils can be determined only approximately and indirectly, the area necessary to make a country self-sustaining as regards the production of timber can be found with greater accuracy. If we compare the exports and imports of the different countries with the forest area for every 100 inhabitants, we find that countries with 92 acres or more per 100 inhabitants have a surplus of exports over imports, while those with 85 acres or less have a surplus of imports over exports. Apparent exceptions to this rule appear in the cases of Bulgaria and Servia. These countries, while at present importing more wood than they export, possess considerable areas of forest, now inaccessible, and, with the development of means of exploitation and the increased demand for lumber, they will in time become exporting countries.

From this we may infer that a country in order to be self-sustaining as regards its timber supply must have an area of about 100 acres of forest land for every 100 inhabitants. The area necessary to supply all the wood needed for home consumption will vary, of course, with the per capita consumption; and the 100 acres per 100 inhabitants must be considered the minimum area, because it is based upon a moderate per capita consumption, such as is found in densely populated countries of Europe, like Germany or France.

The same minimum area for every 100 inhabitants necessary to make a country self-sustaining can also be deduced in another way. At present Germany imports 353,000,000 cubic feet of wood from abroad. To produce this amount of timber Germany would have to possess a forest area of 17,000,000 acres in addition to the 35,000,000 acres now available. In other words, she would need 52,000,00 acres of forest in order to meet her own timber requirements, or 93.2 acres for every 100 inhabitants. Germany is an extremely good example with which the productivity of the forests of all other countries can be compared, because her forests can be taken as a standard of productiveness.

A TIMBER FAMINE NOT UNLIKELY

In this country, where the per capita consumption is six times as great as that in Germany or France and the annual growth per acre may be estimated roughly as one-third of that in those countries, the forest area would have to be 1,600 acres for each 100 inhabitants, or more than twice the present area, in order to maintain the present cut. The present area of 775 acres for every 100 inhabitants at the present per capita consumption and annual growth per acre would be insufficient to meet our own needs if there were not present a supply of virgin timber, the accumulated capital of centuries, to meet the deficiency. With the exhaustion of this remaining virgin supply, which can last only about thirty years more, there must come a time when not only all our exports of timber must cease, but there will not be enough wood for home consumption.

Even as it is, the total exports of wood from this country amount to only 5 per cent of the lumber cut, while the surplus of exports over imports is only 1.8 per cent—an insignificant amount. This shows clearly that we have practically ceased to be an exporting country, and the tendency will be more and more toward becoming a wood-importing country.

How shall this shortage be met?

With an increasing demand for land for agricultural crops there is little hope of increasing the extent of forest land. As we have seen, the area necessary for this purpose would have to be more than double the present area, and this is entirely out of the question. Much of the land now under forest, but capable of producing crops, will have to be cleared and tilled to provide for an increased population. All the evidence, therefore, is that the land under forest will, during the next fifty years, be reduced to 450,000,000 acres, and this reduced area will have to provide for a population almost twice as large as the present. Nor will there be much hope for covering the shortage in our home production by importations from abroad.

NO HELP FROM ABROAD

The demand for timber is constantly growing all over the world. It increases at the rate of 5 per cent annually. If we compare the total excess of imports over exports of all wood-importing countries of Europe with the total excess of exports over imports of all wood-exporting countries, we shall find that there is a deficit for Europe of 141,000,000 cubic feet, which is met at present by imports from North America. Sweden, Norway, and Austria-Hungary have already touched the highest point in their exports. Russia could probably increase to some extent its exports from the north, where there are still large areas of virgin forest, but the growing home consumption and the growing scarcity of timber in the other parts of the Empire make it very unlikely that larger supplies of timber for export will be available. Canada is still able to increase its exports, but the drain upon the Canadian forests is growing every year, and they will remain the only source of supply to satisfy the urgent needs of the rest of the world for coniferous timber after Austria-Hungary and Russia cease to be exporting countries. Under such conditions there will be many bidders for the Canadian timber, and the United States will by no means have an exclusive claim.

The growing demand for wood material must be met, then, not by an increase of the forest land nor by depending on imports from abroad, but by an increase in the productiveness of the forest and a decrease in the waste, to which chiefly is due the fact that the United States has the greatest per capita consumption in the world.

A reduction of the per capita consumption of wood in the United States would not mean a lowering of the standard of living, as would be the case, for instance, with a similar decrease in the consumption of wheat. Abundance breeds extravagance, and the present per capita consumption is not a true indica-

Photo from U. S. Forest Service

MOUNTAIN ROAD WITH PEELED TIMBER (WHITE FIR) HAULED OUT WHERE IT CAN BE REACHED BY THE LOGGING WAGONS: GERMANY

tion of the real needs of the people. Countries with greatly differing standards of living, such as the United States, Sweden, Canada, and Russia, but with abundance of forests, all show a high per capita consumption of wood. The waste in the utilization of our timber products is enormous. We use only 50 per cent of the total volume of the tree and leave 50 per cent to be wasted. We are just beginning to learn the usefulness of many trees hitherto considered worthless. We are just beginning to learn to prolong the life of ties, poles, and posts by means of preservative treatment.

It is safe to assume that by greater economy in the use of wood the per capita consumption could easily be reduced from 260 to 150 or even 100 cubic feet without curtailing in the least the real needs of the people.

THE PRODUCTIVENESS OF OUR FORESTS CAN BE GREATLY INCREASED

The other, even more effective, means of meeting the increasing demand for wood is by increasing the productiveness of the forest land. The annual production of our forests is scarcely more than 12 cubic feet per acre of all kinds of wood, including firewood, of which less than 10 cubic feet is of log and bolt sizes, while for all of Germany the annual growth per acre is more than 38 cubic feet, and the forests of Saxony produce 93 cubic feet, those of Switzerland 50 cubic feet, and those of France nearly 40 cubic feet. Our forests have been badly burned in the past and have been entirely neglected. By proper care and protection the forests of the United States cannot only be made to produce as much as those of France or Switzerland, but they can pro-

duce even more. While a portion of our forests, confined to the North and to the Rocky Mountains, is naturally of slow growth, the bulk of the forests is in the regions extremely favorable to tree growth, as in the Southern Appalachians and on the Pacific coast. They are stocked, on the whole, with very fast growing species, capable of attaining enormous dimensions, and are still growing on a virgin soil possessing wonderful productive power. Under such conditions the annual growth per acre in our forests can easily be increased to two or even three times the present growth within a comparatively short time.

With the per capita consumption reduced to 150 cubic feet and an annual growth per acre of only 50 cubic feet, the 450,000,000 acres upon which we shall have to depend for our timber will be capable of supplying the needs of a population of 150,000,000 people.

That this is entirely within the bounds of realization is well shown in the case of the hardwood supply in the Southern Appalachian Mountains. Studies by the Forest Service in the Cumberland Mountains of eastern Tennessee showed that under protection these woods are capable of producing even at present an average of 50 cubic feet annually. Taking the annual production at only 40 cubic feet, this would mean that the 75,000,000 acres of absolute forest land embraced in the Appalachian region would produce 3,000,000,000 cubic feet annually, which represents practically the total hardwood cut in the country. What is true of the hardwoods is also true of the softwoods in the Rockies, in the Pacific coast mountains, and in the Northeast.

The sooner we realize as a nation that the forest land in this country will have to be reduced in order to make room for agricultural crops and that our only salvation as regards the timber supply lies in increasing the productiveness of our forest land and eliminating all possible waste, the sooner we shall solve the problem of the source of the future timber supply. From a national economic point of view, it is an enormous waste to allow 550,000,000 acres of burnt-over and neglected land to go on producing an amount which, under proper forest management, could be produced by an area half as large, and thus preventing the other half from being used for some other purpose.

What is true of the forest as a source of timber is also true of the forest as a protective cover. The influence of the forest on the climate and the flow of water in streams depends not merely on its extent, but chiefly on its condition. A vast forest area repeatedly burned, with the humus cover destroyed, has not as much value as a smaller forest area fully stocked with rich vegetable mold and the soil in good condition.

A CAREFUL CLASSIFICATION OF OUR LAND IS REQUIRED

It is the duty of the government to help the people in adjusting the various lands for the uses to which they are best adapted by classifying them upon the basis of their properties and the climatic conditions. A thorough survey of the lands in the United States with the view of determining the best use to which the various classes could be put would go a long way toward bringing about the most productive use of our greatest resource—the land. In 1898 the Japanese government appropriated about $13,000,000 for the purpose of classifying the land within the government forests into exclusively forest land and land that could be used for agriculture.

Fortunately, the physiographic and climatic conditions of our country are such that, no matter how great the demand for agricultural land may be in the future, the area exclusively adapted to the production of timber should, if properly cared for, be large enough to supply all of our needs for wood and to exercise the protective function.

It is, therefore, not by resisting the inevitable economic progress of this country that we can best solve the serious problem of providing for the future timber supply, but by looking the facts squarely in the face and beginning immediately to prepare ourselves for the time when a reduced forest area will have to meet an increasing demand for timber. We must do it now, while it is not too late.

NATIONAL GEOGRAPHIC SOCIETY ALASKA EXPEDITION

IN a previous number of this Magazine announcement was made of an appropriation by the Board of Managers of the National Geographic Society of $5,000 to be expended in research work during 1909. The Committee on Research of the Society with these funds has organized an expedition to spend July, August, and September studying the glaciers of southeastern Alaska. These glaciers are in many respects the most important in the world, geographically; they have been little studied and it is believed that a careful investigation of them will be most useful. The expedition is headed by Prof. Ralph S. Tarr, of the Department of Geography in Cornell University, and author of numerous geographic textbooks, and Prof. Lawrence Martin, of the Department of Geology of the University of Wisconsin. The expedition will leave Seattle on the steamer *Portland* June 24.

Mr W. B. Lewis, of the United States Geological Survey, will accompany the expedition as topographer, and O. D. von Engeln, Instructor of Physical Geography at Cornell University, as photographer.

The party will proceed direct to Yakutat Bay, where Professor Tarr has previously made two expeditions for the United States Geological Survey—one in 1905, the other in 1906. Professor Martin was attached to the first of these expeditions as Special Geographic Assistant.

The Yakutat Bay region has yielded rich results from previous geographical work. It was from this base, in 1890, that Professor Russell, under the auspices of the National Geographic Society, made his first expedition to Mount Saint Elias, and it was to the shores of this bay that he returned on his second expedition in 1891. To Professor Russell's expeditions we owe the first thorough description of the great Malaspina glacier, the largest on the North American continent, and the type of the Piedmont glacier. Yakutat Bay was also visited in 1899 by the Harriman expedition, and in Dr Gilbert's report upon the Glaciers and Glaciation of Alaska considerable space is given to the study of the glacial phenomena in this inlet, illustrated by maps made by Mr. Henry Gannett.

COAST ELEVATED 47 FEET BY EARTHQUAKE

In September, 1899, the coast of Alaska, in the vicinity of Mount Saint Elias, was visited by a series of heavy earthquake shocks, and in the expedition of 1905 it was found that the coast line of Yakutat Bay had been greatly deformed at the time of the earthquakes. In some places the coast was depressed, in others it was upraised, in one section to a height of 47 feet, the greatest known elevation of the coast that can be assigned to a single earth movement.

Up to 1905 the glaciers of Yakutat Bay had been in a state of stagnation and recession during the period of observation, but the expedition of 1906 discovered a series of remarkable changes in several of the glaciers. Where in August, 1905, it was possible to walk over the smooth, practically uncrevassed surfaces of these glaciers, in June, 1906, the smooth surfaces were replaced by a sea of crevasses, over which travel was practically impossible. No such sudden change in glacier conditions has ever before been recorded, and the study of the phenomena is therefore a matter of great interest to glacialists. The explanation which has been assigned to this change in glacier condition is that during the earthquakes of September, 1899, vast quantities of snow, ice, and stone were avalanched down upon the reservoirs of the glaciers, giving such a sudden addition to the glacier supply that a wave of advance was started which, sweeping rapidly down the glaciers, broke the rigid, stagnant mass into a maze of crevasses and sérac—a veritable glacier flood.

Since only five out of the many glaciers of the region had felt the impulse of this glacier flood of 1906, it is considered probable that the effect of the earthquakes had not yet reached the ends of

This picture represents one of the heathen festivals held in southern India, to which thousands gather every twelve years from all over India, when, according to devotion or consecration, the devotees fast from one to twelve days and await the appearance of the sacred shell which "comes up out of the water when the priest assigned to the office has 'searched' for it." In their frenzy thousands plunge into the tank or lake, hoping for purification of soul and body when the waters are moved. In the crush many are injured and large numbers drowned, in spite of the precautions taken by the English government to protect life. During this ceremony the gods are anointed with perfumed oils from the lemon, saffron, soapnut, banana, cocoanut, sugar, raisins; then milk is poured over, and the devotees eagerly secure the sacred draught, moisten the forehead and eyes, and then drink what remains in their palms, after which incense and camphor gum are burned. These vast throngs show slight regard for caste, and the rule of seclusion for women is apparently forgotten.

A HINDU RELIGIOUS FESTIVAL

Photo from Mrs Ada Lee

The great annual Hindu religious festival at Gunga Saugar, at the mouth of the Ganges, north India. Thousands of pilgrims flock there every year to perform religious vows and, by bathing in the sacred waters, to obtain purification from sins.

the others, and it is hoped, therefore, that evidence of advance in other glaciers may now be present in this region. It is one of the prime purposes of the present expedition to search especially for changes related to the earthquake shaking. Photographs and maps of the more important glaciers of the region will be made for comparison with previous records and as a basis for future comparisons.

If the work in Yakutat Bay can be finished early enough, as is hoped, the expedition will proceed to Prince William Sound and there undertake the study, mapping, and photographing of the larger glaciers of this region, notably those in the Port Wells Inlet. Following that, if time permits, a reconnaissance trip will be made to Controller Bay and up the Copper River for the purpose of laying out possible future work on the glaciers of this vicinity.

THE LARGEST GLACIERS IN NORTH AMERICA

The glaciers of Alaska, although the largest on the continent, are still known only in part. Their great size and the large number of important results that have been obtained from the studies so far carried on give basis for the belief that a study through a series of years, including the more important Alaskan glaciers, will yield results of the very highest value. It is not merely that the glaciers themselves present interesting phenomena, but also that they throw light upon problems of continental glaciation in northwestern Europe and northeastern North America. The fruitful results of studies from this standpoint depend in part upon the large size of the glaciers and in part upon the fact that they terminate in a temperate climate near sea-level. In many respects, therefore, the marginal phenomena of the Alaskan glaciers represent more closely the conditions at the margin of the Continental glacier than do even such large ice masses as the Greenland and Antarctic ice caps.

NOTICE TO MEMBERS

ON another page of this number announcement is made by the National Geographic Society of the early publication of a second series of "Scenes from Every Land." It is earnestly hoped that those members of the Society and readers of this Magazine who desire copies of this publication will make their reservation as early as possible. Several thousand members of the Society failed to secure copies of the first series, published two years ago, because of their delay in making reservations. As the Society is put to great expense by the publication, the size of the edition is limited to the apparent demand from the members. The new volume will in every respect surpass its predecessor, and will be more handsomely bound, contain more pictures, and we believe will be more useful, as well as interesting.

The Rockies of Canada. By Walter D. Wilcox. Pp. 8-300, 9½ x 6½ inches. Illustrated. New York: G. P. Putnam's Sons. 1909.

This is a third edition of Mr Wilcox's charming work, with three added chapters. He takes the reader with him to Lake Louise, to Paradise Valley, and to the summit of Assiniboine Mountain, one of the finest, if not the finest, of the summits in the Canadian Rockies (see page 512). He recounts his search for the almost mythical Mounts Brown and Hooker, reputed to be between 16,000 and 17,000 feet high. When finally identified they were found to be not over 9,000 feet in altitude. He explores the Vermilion Pass and visits Moraine, Wenkchemna, and O'Hara Lakes. He gives a charming chapter on camp life and on mountaineering, and an excellent one on the big game of the region. The book closes with some account of the Stony Indians.

While Mr Wilcox's story is delightful, his illustrations are perhaps the finest feature of the book. The thirty-eight photogravures, made from photographs taken by himself, are probably among the very finest specimens of outdoor photography and of reproduction to be found. Indeed, as an artistic photographer Mr Wilcox stands among the first in America. The paper, type, and presswork are of the finest.

The work is accompanied by an excellent map, scale 1 : 80000, in contours of 250 feet, a reproduction of maps of the Canadian government. H. G.

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